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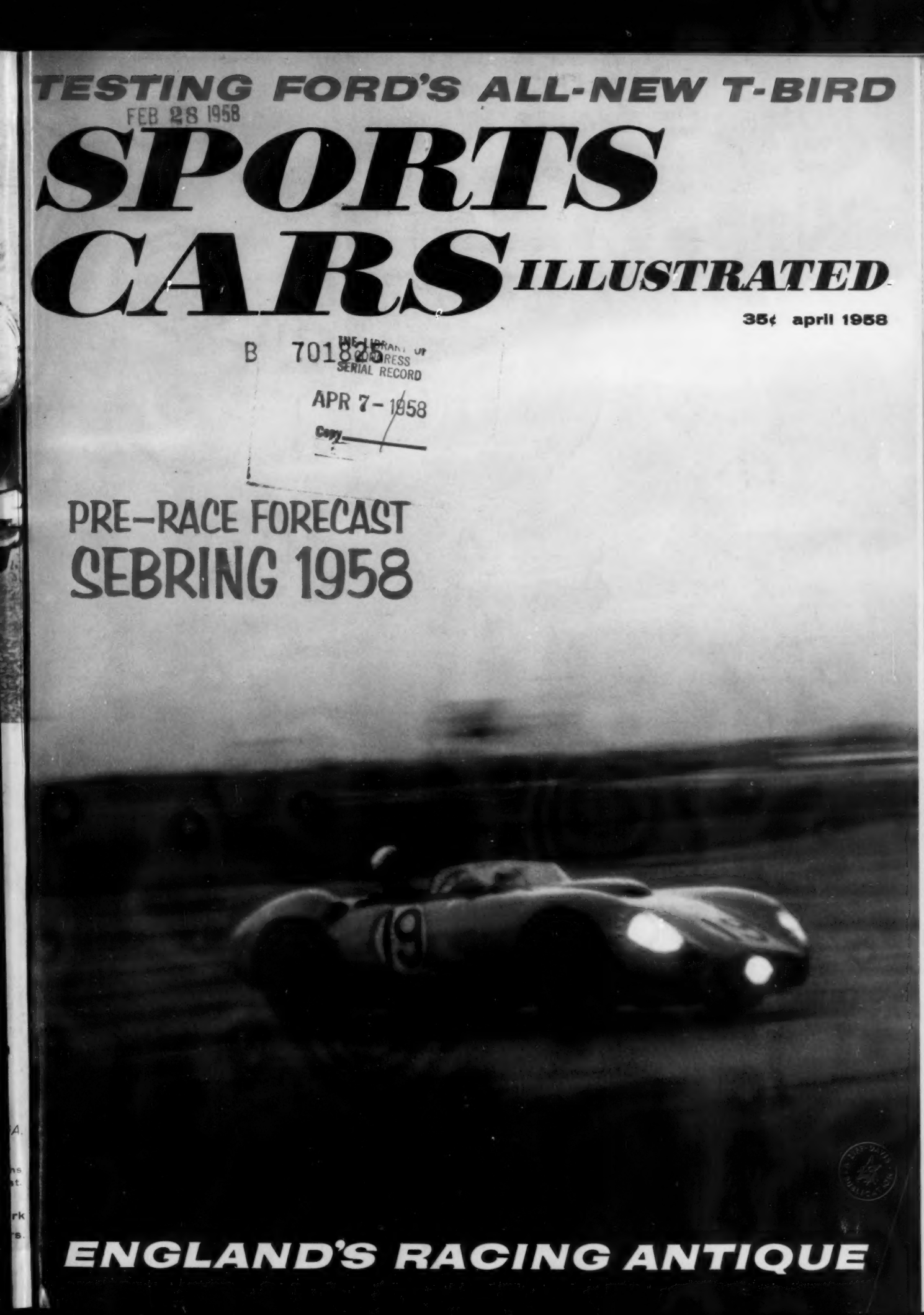

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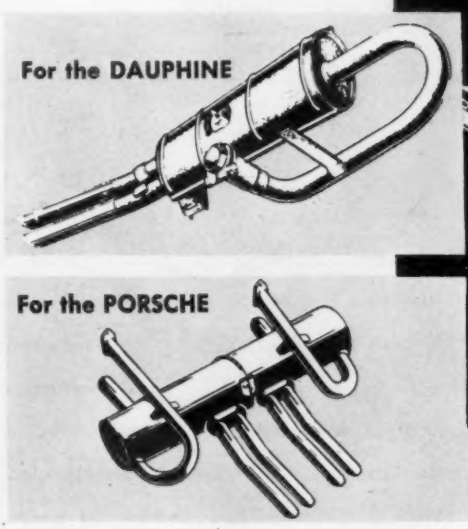

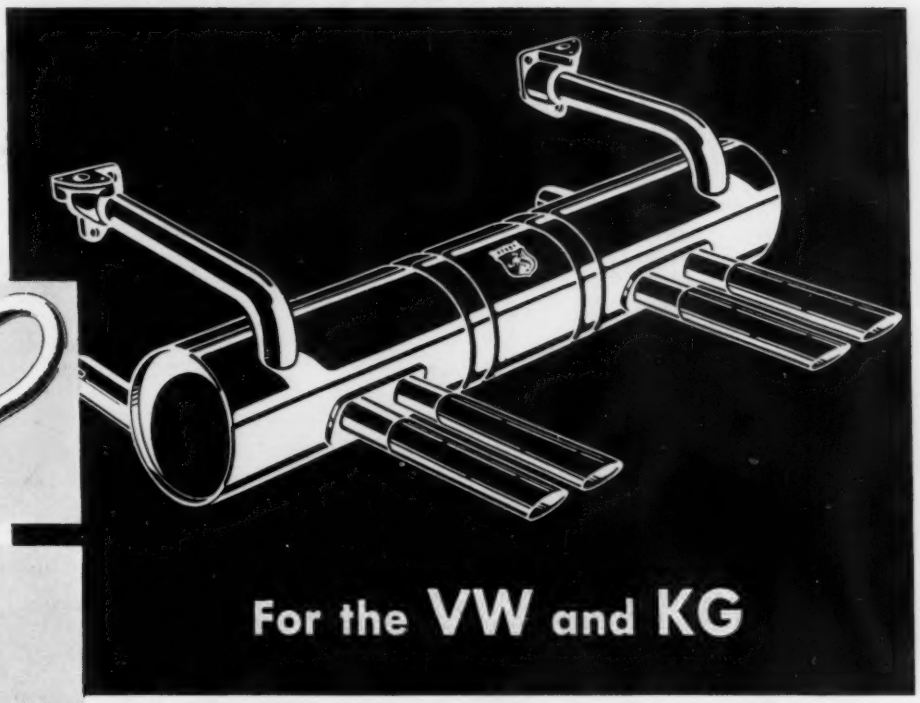

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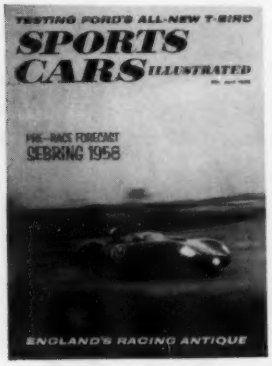

The car on this month's cover will NOT be seen under the same circumstances at Sebring this year. It's the '57 winning 4.5 Maserati, Behra up, but it's 1.5 liters over the limit for '58. Kodachrome is by Ken Sniffen.

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MARION'S MEANDERINGS

By Marion Weber

Hi, there! Well, it's time to go motor racing again, and we have an opportunity to display some of the good things which have been accepted by our speedier clients. And, to offer certain new items brought into the country after extensive tests on the Continent by go-fast people there.

Item #1 is such a piece: FULL VISION GOGGLES with leather-covered, sponge rubber face pads. These are so comfortable you hardly know you have them on and vision is extra good thanks to the two-piece lenses and adjustable nose bridge. Observe the drivers who have raced abroad and note how many wear them. Now you can get them here . . . from US, of course. $6.95 (extra lenses . . . green . . . $3.95)

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very sincerely yours:

SURE YOU'VE SEEN IT. A little yellow and black sticker that says two words, bluntly and succinctly: *Speed Kills.*

Baloney!

This innocent seeming little sticker is part and parcel of one of the most insidious mass brain-washing campaigns since Herr Goebbels propounded the big lie. It's a case of a single germ of truth being used as a base for a plague of misconception. Speed wrongly used or in faulty equipment can be contributory to a fatal accident but speed of itself has never committed murder. The big trouble is that nobody has ever bothered to define the speed that is supposed to do all the killing. Under highway conditions most states peg excessive speed somewhere in the neighborhood of 60 miles an hour. Yet only 10 percent of the nation's automobile fatalities occurred at speeds of 61 to 70 miles an hour. The highest percentage of fatalities, 20 percent occurred in the 41 to 50 mph range and the next highest (16%) in the 31 to 40 range. The source for this comes from the Committee on Speed of the National Safety Council.

Still, despite these facts, the little stickers appear. In the experience of deponent and of most of those to whom we have talked about this, they're usually seen on that prime source of accidents, the car that has eased, without halting, past a boulevard stop into an expressway wherein it proceeds to creep at a "safe" crawl of 30 to 40. Usually such a car has reached his "safe" crawl at an acceleration rate that would do discredit to a rheumatic snail.

In spite of the known facts, the powers that be continue to try to make political capital by tagging onto the big lie and the little sticker that promotes it. Through it all the highway creep continues to cause accidents by forcing others to foolish acts through sheer frustration and by poking his crawling bulk unannounced and without a sideward glance, into what should be the realm of the quick and the good.

Might be an idea for the NSC to do a bit of good by promoting another slogan. This one could read: *Creeps Kill.*

Here's a tip for next month. On February 2 of this year the Auto Union World Record for the standing start kilometer, a mark that experts claim could never be beaten, was smashed by a healthy five percent. The record smasher was Calvin Rice and the speed he turned was a blistering *average* of 123.56 miles an hour – the car an American special. Also broken was Auto Union's Class B record by Ed Cortopassi at an average of 116.43 through the FIA clocks. This means that had a fast car passed either of these machines at 100 mph as they sat on the line and had they gone off as the car passed, they would in turn have shot by the passer before he had gone six tenths of mile. Next month Griff Borgeson will tell the tale of how the "impossible record" was smashed in an operation that was sheer bootstrap.

– john christy

OH YEA!

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letters

CHEV-VAGEN

Chevy engine in a Volkswagen. Goodbye cruel world. BANG!

Bill Speedwin

R.I.P.—Ed.

I seriously suspect that the Cumberford-Mott story on the Volkswagen-Corvette is a big fat hoax, particularly as no photos of the engine installation are used. But, even if it is not, I can't say that I'm particularly impressed with the idea. Now, in *my* VW I have a forty-four liter Daimler-Benz 601 engine that turns out 3,000 horsepower. As this engine takes up the entire interior of the car, it is necessary to drive from inside the front luggage compartment, peering out through a slit.

To fool other drivers, I have painted people on the sides of the engine block so that the car appears to be carrying an entire family.

Due to the tremendous torque of the Daimler-Benz engine, I'm using solid steel tires. On a fast start from a stop light I cut two grooves a foot and a half deep in the concrete.

W. R. C. Shedenhelm

Hollywood *(where else?)*, Cal.

Go man, go!—Ed.

OOPS, SORRY!

I wish to bring to your attention, not as a complaint, but merely to set your records straight, the fact that reference to your February cover is highly inaccurate.

1. Car No. 75, a Ferrari Testa Rossa, belongs to and is driven by me.
2. Car No. 6, a Ferrari Testa Rossa, belongs to Ebby Lunken, also exclusive driver of same and, by the way, is National Contest Board Chairman for SCCA.
3. The only piece of equipment in this beautiful photo, owned by John Edgar, is a Freuhauf van. Both of Edgar's cars, a 4.5 and a 2.9 Maserati, were on the other side of this van along with Joe and Carol Shelby.
4. Scuderia Cincinnati is in no way connected with the Edgar entourage. Our Chief mechanic, Ed Strauchen, can be seen at the far left. I imagine the confusion arose from the fact that the Danville heat forced us to rig an awning from our van to John Edgar's.

Seriously, we all enjoy your superior publication and consider it a fine credit to the sport.

Jack Quackenbush

Cincinnati, Ohio

. . . please note that you have accomplished the greatest feat known to man. You have John Edgar's Maseratis bearing the Ferrari shield . . .

E. Scott German

Towson, Md.

TWO SCHOOLS OF THOUGHT

Sometimes we wonder what the sport is coming to. It seems to us that our beloved sport is being infiltrated by those who own sports cars because they look nice, are

novel, can be made as comfortable as one's living room and because a fellow down the street has one.

Many owners of sports cars call themselves enthusiasts but to us they are merely cashing in on the current popularity of sports cars. Where is the proverbial enthusiast with grease in his ears who drives a topless, radioless, heaterless, mufflerless but very immaculate MG-TC? Where is the chap who used to wave to another sports car owner? Where is the fellow who likes to wind out his mufflerless machine until the tach has no place to go? We very seriously wonder whether there is something wrong with us because we enjoy these things so much.

Your otherwise excellent magazine is partly to blame!! Your recent road test of the Ferrari 250 Europa shows this up. You praise the car for its complete absence of gear and engine noise. The few times that we have ridden in Ferraris are remembered because of those wonderful noises. When you remove these things from a machine, you are removing its soul and character.

Your continuing praise of the monstrous American sedans such as the Fury, Hawk, Dodge D-500 etc. is just another step further away from the true, hairy sports cars with character. Are we a voice in the storm?? Let us hear from those enthusiasts who enjoy what seems to be gone and want nothing to do with the soft, plushy and characterless sports cars of today.

Herbert Miska
Herman J. Rottue
Kurt Miska
Karl A. Muggenburg

. . . How many of us will ever see, let alone buy, a Ferrari, a Lotus, a "violent" VW hybrid, a Denzel 1300, a V12 Maserati or some of your other champagne appetite cars. These cars are for the oddballs. Let's get down to terra firma, and try to improve the local breeds. . . .

Willard C. Poole, Jr.
Stamford, Conn.

Let's climb out of our little patch of terra firma and look around, eh, Junior?—Ed.

AND IN THIS CORNER . . .

. . . Signor Nuvolari would never, *never* have refused to drive the Mille Miglia or the Monza 500, had there been one in his day. I think the all time greatness of a man should be determined somewhat by things like this, as well as by the cold, black-and-white percentage of races won, etc.

A. K. Bradford
Westfield, Mass.

In Ken Purdy's article on "The World's Finest Driver," I think he over-emphasized the whole idea. Fangio and Nuvolari lived in two different eras of auto design and engineering; therefore they're non-comparable. The only thing they have in common is that they were both very *excellent* drivers, and world champions at different intervals. But still they can't be compared. If both of them lived and drove in the same era, then they could be. . . .

Darryl Sutphin
Lewisburg, W. Va.

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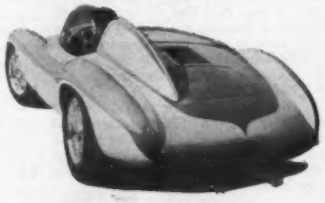

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KARMANN-GHIA PORSCHE?

I own a VW Karmann-Ghia, pretty but gutless. I'd like to put a Porsche engine in it, not for racing, just driving. What tips can you give me on installation difficulties, weak points and all that sort of thing.

R. W. Hammond
Gibsons, B. C.

There's absolutely no trouble involved in mating the engine and gearbox as the earliest Porsches used VW cases for both. Subsequent changes have been spread over such a long time that they all still fit. I don't think the K-G will present any problems not met and already overcome by some VW sedan owners. The first shock is when you find that the larger valve cover of the Porsche interferes with the "frame" — near the bumper mounts. When we did this job (back in '53) we were in a big hurry to get to that race and surprise the MGs, so we just carved up the frame.

If it had been my own engine, I would rather have reshaped the valve covers by cutting off the offending rear corners and brazing in a flat piece that would just clear the rocker arms underneath, but it would still be a tight fit. The old accelerator cable can be cut and its end tied (literally) to the Porsche throttle rod. The VW choke cable can be just tied up in a knot and thrown away, as the accelerator pumps are so large on the Porsche's Solexes. Or you can put it to use as a hand throttle.

The next serious problem is the muffler. The VW's won't fit the Porsche engine and the Porsche's won't fit inside the VW's body. The solution is to take one or the other to a muffler shop in your area and have them modify either the VW's connections to the cylinder heads or shorten the Porsche muffler's can.

But now that you've got all this power, I strongly recommend that you fit 1954 or later Porsche aluminum brake drums and backing plates, especially to the front wheels. Otherwise your K-G will be vastly under-braked. For VW sedan owners, the K-G's stabilizer (anti-roll bar) kit is to be recommended as it only costs about $10.

WIRE WHEELS

I own a Volvo which I think would look great with wire wheels and knock off hubs. What are the advantages of wire wheels and the stock disc wheels? Are there any special problems involved in converting? Would a set of wheels from an Austin Healey 100 be satisfactory? Where can I get the necessary parts? How much will all this cost?

John V. Twelker
San Diego, Calif.

Wire wheels look prettier, cost more and can let more air get past the brake drums to cool them. Their strength depends on the number of spokes and their disposition, as well as their size. Some wire wheels are stronger than the disc wheels they replace, for instance on the Triumph and Morgan, but this is not always so.

One drawback to wire wheels is that the weight of the hub and the wheel often exceeds that of the disc wheel. This increase

NOTES

in unsprung weight reduces cornering ability and, to a small extent, riding comfort.

The usual method of converting is to obtain a splined or toothed adaptor hub which can be bolted to the brake drums with the old wheel bolts. The wire wheel is fitted over this and fastened on with the knock off hub cap. Since Triumphs fit their wire wheels by means of such an adaptor, they would seem to be your best bet. The difficulty with the Volvo is that it has a five bolt attachment whereas the TR uses but four. Check the diameter of the bolt circles to see if the adaptor hub can be drilled to suit the Volvo's bolt pattern.

The Dayton Wheel Products, 300 So. Monroe St., Xenia, Ohio make wire wheels using "dental drive" instead of splines. They now market adaptors and wheels for the VW and Porsche and probably will make some up for your Volvo.

3.8 JAGUARS

Would it be possible to give me a few details on enlarging the D-type Jaguar engine to 3.8 liters: The bore size required for 3800 cc. The availability of pistons of this bore size. Are any alterations to be made to the head? The availability of a suitable head gasket. Is there a change in valve size?

Michael E. Morris
Indianapolis, Indiana

For exactly 3800 cc, my slide rule comes up with 87.2 mm bore. But those who have already tried this enlarging trick seem to have settled on either 87 mm which gives 3785 cc or 3-7/16 (3.4375 in) which gives 3810 cc. Alfred Momo uses the former and further to be on the safe side, he now bores the block extra large and drops in sleeves. This isn't always *necessary but as his second 3.8 cracked a block, he's done it ever since. The factory makes 87 mm pistons for the racing department, but these are not for sale to the general public. Momo got his first ones from Jahns. To get the desired comp. ratio (9.7 or 10.0 to one), the wrist-pin hole was lowered. However, the boss wasn't and so the pistons were none too strong. Perhaps if enough of our readers ask them to, Jahns will come up with a modified pattern for 3.8 Jags. The standard steel head gasket is trimmed slightly so that its edges won't get burnt.*

The works D-types have a special head (also not available to the public) with intake valves 2" x 45° at 35° from vertical (same as stock) and exhaust valves 1-11/16" x 45° at 40° from vertical, 5° more than the stock head. Because of this last-mentioned item, it isn't possible to bring a standard head, D-type or otherwise, up to works specs. After all, there are limits to what can be done with a portable grinder! The standard D uses 1⅞ x 30° intakes and 1⅝ x 45° exhausts, the latter being the same at the XK-140MC and XK-150. I would not go beyond these sizes.

Stephen F. Wilder

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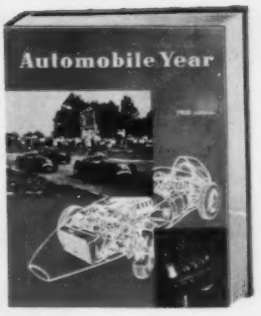

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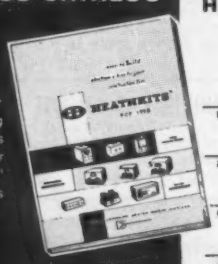

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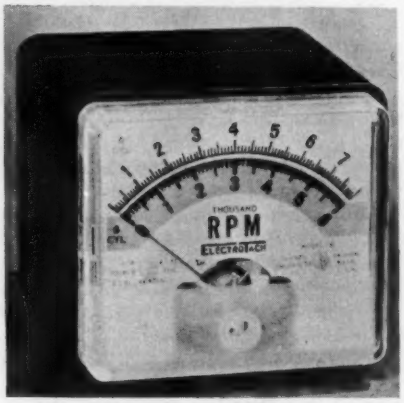

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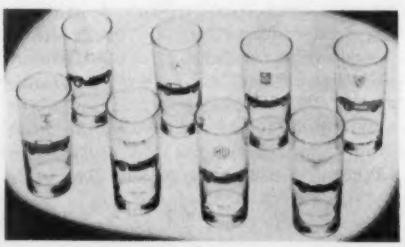

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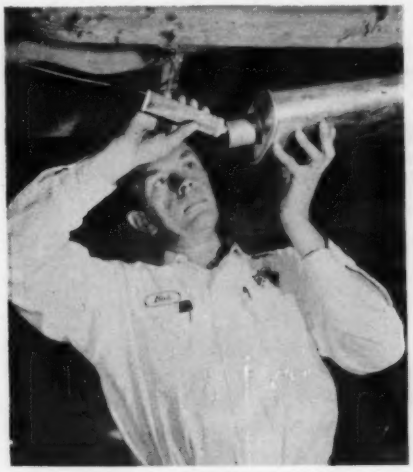
For enthusiasts, both amateur and pro, Magic Muffler Sealer has introduced a mechanics' helper, merchandised in hardware stores in six-ounce plastic tubes. It is formulated to eliminate the headache involved in installing slightly mismated exhaust components to road machines, and to tightly seal those that fit exactly. It is said to be impervious to both gasoline and oil. Price: $1.00.



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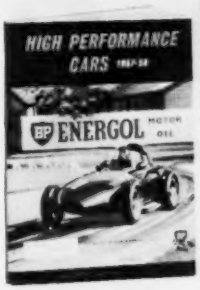
Formulated to dissolve the particular breed of dirt and grit that accumulates on sports cars, Auto Marine Corp., 282 Plaza Theatre Bldg., Kansas City, Mo., is marketing a no-wipe-dry car soap. Sold in non-breakable easy-pour bottles, the manufacturer states that it will remove only the dirt and not the wax.



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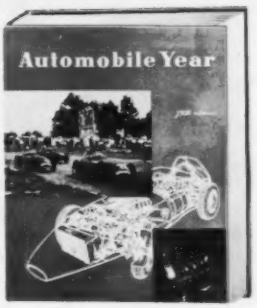
(Annual Automobile Review #5)



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AUTOMOBILE YEAR 1957

(Annual Automobile Review #4)

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AUTOMOBILE YEAR 1956

(Annual Automobile Review #3)

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Sebring

Illustrations: Richard Green

THE LATEST INFO as we go to press (just before entries close) is that Alec Ulmann is burning up the airwaves to Stuttgart, trying *very* hard to get Daimler-Benz to reenter racing *now*. Whether he will succeed or not is quite up in the air. They like to go racing only when they are sure they can win, because to them racing is a part of their advertising program, not of their bloodstream. And with cars that haven't been touched since 1955, well.... Look at the newest Ferrari, if you want to see what they're up against.

For the three liter limit, Enzo only had to dip into that old bagful of bores and strokes. What he came up with is an oversquare V-12 of 2.88 x 2.31 in (73 x 58.8 mm), the same as used on the 250 GT since 1956 as well as on the 1951 *Europa and* 1952 *Mille Miglia* models. The big differences today are the new heads with individual intake ports and six double-choke Weber carburetors. Because of all the crowding, spark plugs have been moved to the outboard side of the heads, as on the 4.9. The four-speed, all-synchro gearbox, straight off the GT, is mounted to the engine. The rear suspension, indeed, all of the chassis is pure *Testa Rossa* (SCI, March, '57), though the wheelbase is stretched out four inches. Brakes are larger editions of T-R and the steering is by Z-F. For reasons unkown to us, the first car delivered (to von Neumann) had left hand drive.

At the moment Ferrari appears to be the standout numerically with six or maybe seven cars in the running. These vary from the new 250 Testa Rossas to the 2.0 four banger T-Rs and V-12 GT coupes. Drivers make an impressive list: Hill-Collins, Hawthorn-Musso, von Trips-Gendebien, Ginther-von Neumann, Lloyd-Andre, and Rubirosa-Malle. Tentatively, you may add a feminine touch with Denise McCluggage-Ruth Levy. An enlarged T-R at 2.5 liters might have better torque characteristics with four big cylinders than the 250 V-12 three liter. But the impressively stylish ducting around the front brakes on the latter is not to be discounted, because the Florida circuit is a torture chamber for brakes,

Forecast

by Stephen F. Wilder

more so than any other we can think of. It has seven corners per lap that demand severe braking — about two per minute — and four of them are preceded by approaches over 4000 feet long.

Maserati looks rather let down with but three cars, and none of them Buell's, who will race only his 4.7 (where?). Two 300Ss, driven by Rose-Ruby and Duncan-Bonnier and a 200SI in the hands of Kimberly-Ulrich.

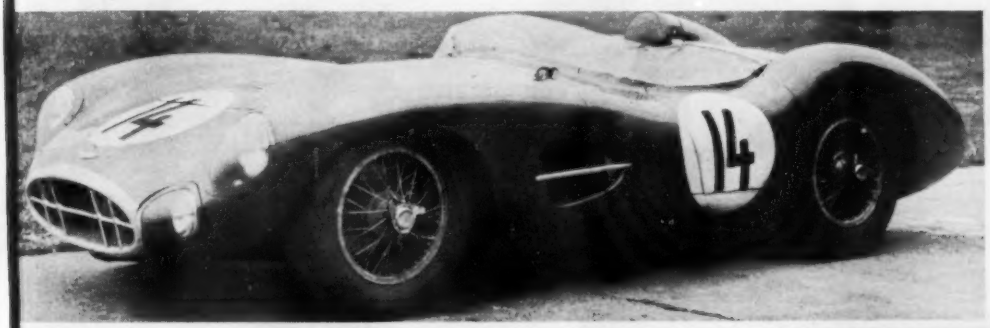
Aston-Martin is making a very serious bid with two DBR1s and a single Mark III GT coupe. Making up for small numbers is the list of drivers: Moss, Shelby, Brooks and Salvadori for sure and maybe Fitch too.

Jaguar's honor is being defended by quite a geographical melange. Destroked D's will be run by the Ecurie Ecosse (Scotland) with Flockhart, Sanderson, Gregory and Bueb plus Fairman as reserve for either car A third D, from Indianapolis, is entered by Jack Ensley, but he is in a bit of a quandary for a co-driver, as Pat O'Connor has just been "stolen" from him by Briggs Cunningham for his pair of Lister-Jaguars. Other drivers for Briggs are Hansgen, Scott-Brown and Crawford.

Porsches are entered in considerable quantity, five cars with ten well-known "pushers": Barth-von Frankenberg, von Hanstein-Linge, Kunstle Miles, Wallace-Holbert and Bunker-Beaufort.

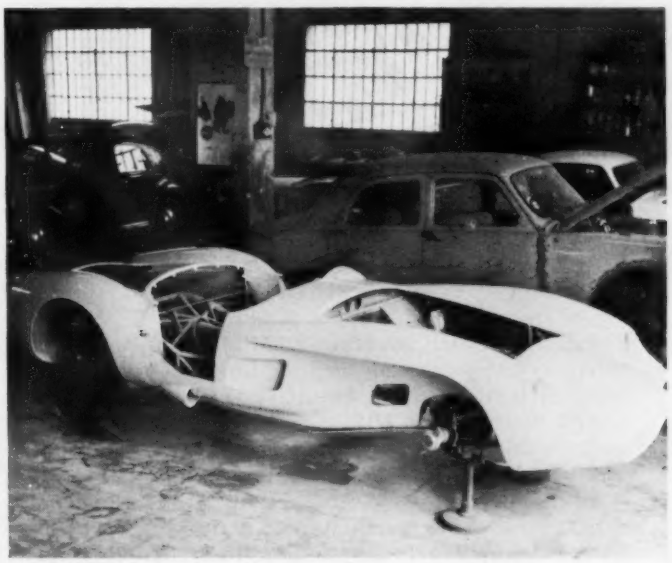
Elvas, having tasted victory at Nassau, are out for blood with three 1100 cc cars. Eight drivers are paired as follows: Kolb-Martin-Baptista, Bentley-Bradley, Wylie (Dr. *and* Mrs.) -Dietrich (Mr.). Giving them serious opposition will be the Lotus entry of two 1100's (Chamberlain-Frost and Allison-Weiss) and one 1500 (Chapman-Pallakson).

(Continued on page 58)



Aston's DBR1/300 has three major wins, on fast road courses. Moss and Brooks driving, and quick-change pads in the disc brakes, it may show up well on Sebring's stop and go 5.2 mile airport circuit.

The 250 Testa Rossa is Ferrari's 1958 team sports car. Scaglietti, who builds bodies for all the racing Ferraris, came up with this exciting derivation of the old F-1 cars.



The front fenders aren't much more than headlight shrouds, letting air right at brakes, past Dzus'd on cowl.

Brakes go round and round and hot air comes out here . . .

SCI ROAD TEST: FORD'S THUNDERBIRD

'Bird for '58—a controversial concept

THE ORIGINAL Thunderbird was hatched late in '54 but the project had been launched long before, when the sports-car movement in the U.S. was very new and its potential could only be guessed at. The number of home-grown two-seaters that could be sold to the American public had to be determined, and for this the early Bird was created. Sensing limitations inherent in the "sports car" concept, FMC avoided using that label and called its unique product a "personal car," meaning one with a high measure of individuality.

The little Bird scarcely had gone on sale and begun to test the market when its designers went to work on an obviously more widely saleable type of personal vehicle, a four-seater. As the answer to "how many two-seaters will the market absorb?" became clear it was decided to retire the two-place package in favor of a similarly individualistic product that, with doubled passenger carrying capacity, might have twice the two-seater's sales potential. To those who, within and without FMC, felt in the words of John Keats, "Thou wast not born for death, immortal Bird!" there was just one rational answer. In the car business the point is to sell as many cars as possible.

It is doubtful that anyone appreciates the two-place Bird any more than the people within FMC. Here was a car for which hordes of consumers felt actual, emotional love. There are Ford executives who claim that the little Bird has earned more free publicity for the firm than the Model T ever did. It certainly has brought FMC far more prestige and voluntary free promotion than the Lincoln Continental, to which it bears a certain essential resemblance. It quickly proved that a clever U.S. manufacturer can tackle what traditionally has been a foreign specialty, compete with it with great success and even establish a form of leadership in an erstwhile alien field. And in spite of the fact that most citizens have the very mistaken idea that the Bird "costs about the same as a Ford," the little Bird promptly became one of the most potent status symbols on the domestic scene.

By means of the two-place Bird FMC learned a great deal about the kind of people who buy cars of this type. About 92 per cent of them ordered their cars with automatic trans-

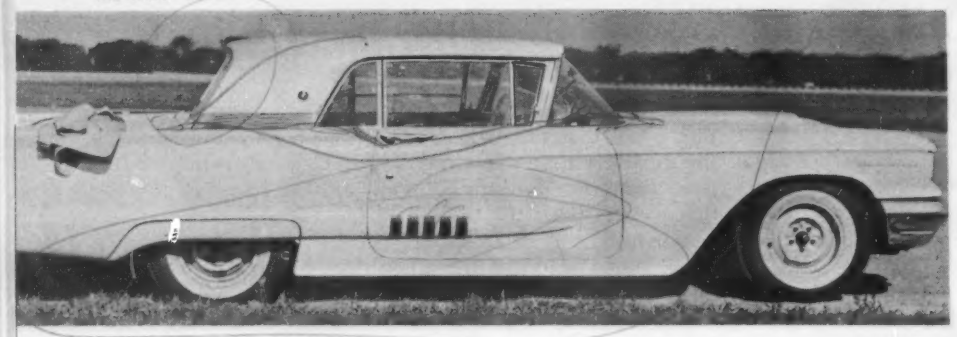
Front is blunt looking, with four headlights set in fenders; riding lights and grille in bumper.

missions, a sure sign of tastes that are far from spartan. Further proof that this basically is a luxury market came with the discovery that a very high percentage was purchased by two- and even three-car families. Market research showed that owners liked the little Bird for its style, performance and handling. Loud and numerous complaints were tabulated, aimed at its difficulty of entry and exit, and its limitations on comfort, passenger space and luggage space. The ceiling on sales turned out to be about 16,000 per twelve months, with few takers outside of metropolitan areas and car-happy Southern California. To sell more units and to sell them more widely, the four-place Bird has been launched and the little Bird's legend as a classic has begun.

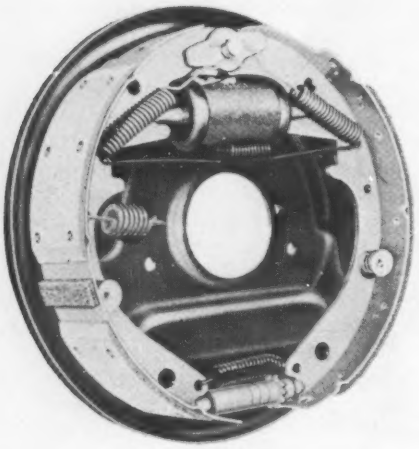
We first saw and drove the new car at FMC's Dearborn proving ground. The initial impression was startling. We expected to see something small and lean but what we found looked big and broad . . . part Continental Mk II and part Turnpike Cruiser, having little resemblance to the little Bird. There was a similarity in the top's profile but, below the greenhouse, it was a plumper, heavier, longer, more massive vehicle; yet it couldn't exactly be called big.

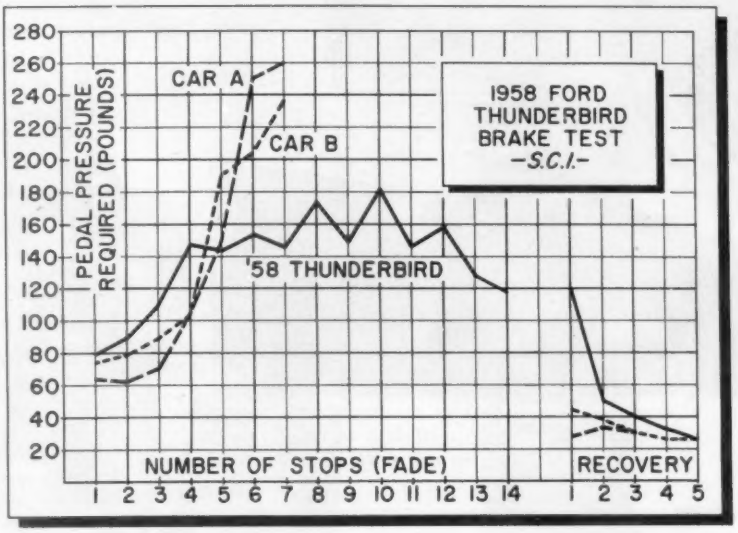
Evidently the base line for the new Bird's design was the height of the little Bird . . . this approximate height was selected as a means of establishing a family resemblance between the two- and four-seaters. All the rest of the car's proportions are keyed to this vertical dimension. The wheelbase is tied to this height and to the minimum distance in which four people can be seated in comfort. Unit body-frame construction was chosen primarily for its effect on interior space saving. It made possible lowering the floor pan to the bottom of the frame side boxes, which added almost four inches to the floor-to-roof measurement. Now the Bird's occupants sit on chair-height seats (as they *must* within a short wheelbase, and not only for reasons of comfort) but have about 1.6 inches more headroom than in the smaller Bird.

In tight bend at high speed, even the license plate leans. Inside wheel lifts; outside tire squats under heavy loading.



Long and low, new Thunderbird represents Ford's effort at a four seater "sports" car, such as it is.





LEFT. Each brake assembly has a ¾ inch segment of cerametalix lining welded to the trailing shoe. RIGHT. Chart shows results of Ford Motor Co. brake tests. All vehicles were loaded to simulate a four passenger load with a full tank of gasoline. Stops were made from an actual 90 mph at intervals of about one mile and at a deceleration rate of 15 ft/sec² (about 0.5 g). After coming to a stop, the car is accelerated at full throttle to 90 mph, a speed which is maintained for some ⅞ mile, when the next stop begins. Since decelartion is held constant, the increase in pedal pressure required during a series of stops serves as a useful measure of fade. Recovery stops are made immediately after the fade stops with no interval for cooling. Circumstances are the same except that stops are made from a sustained 30 mph. Decreasing pedal pressure recovery is still taking place, while consistently low readings show complete recovery. Cars A and B represent "better than average fade resistance of two 1957 American-built cars" according to FMC.

The confusing thing about the new Bird's skilfully-devised proportions is that it's hard to decide just how big or small the car actually is when it stands alone. The giveaway comes the moment you see it alongside what, in this context, can be called "impersonal" Detroit cars. Its lowness of top, hood and deck are dramatic. It stands out sharply in a crowd of conventional sedans, in a typical flow of traffic. Because of this and its near-total lack of decorative trim (front and rear grille and light treatments meet this requirement adequately) the new Bird fully retains the "personal car" character.

Just where it stands relative to bigness or compactness perhaps can best be told in inch measurements:

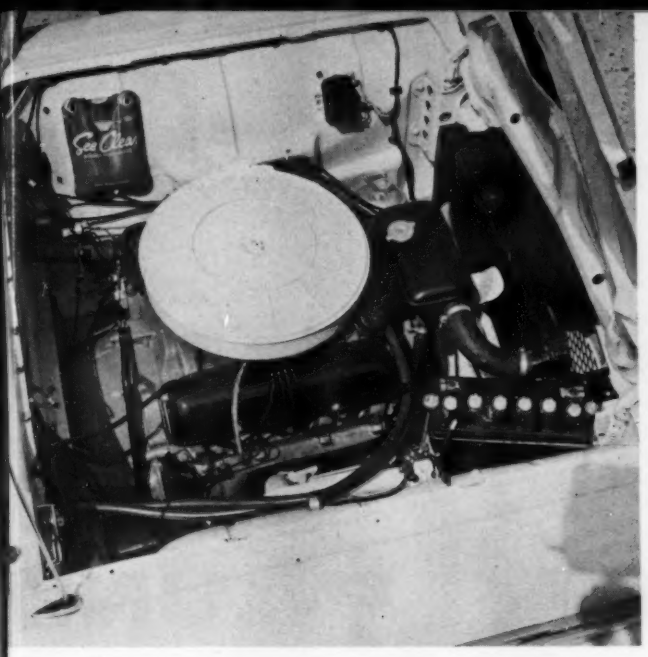
Car	Height	Wheel-base	Length	Width
'57 Bird	51.5	102	182	73
'58 Bird	52.5	113	205	77
'58 Ford Custom	57.1	116	202	78
'58 Mercury Monterey	56.5	122	213	81
'58 Lincoln	56.5	131	229	80

The new Bird is two feet longer than the old one and two feet shorter than the current Lincoln. It will compete on the Lincoln, Cadillac, Imperial market level as a high-performance personal car that is compact, that says "status" without extorting a size penalty.

Interestingly enough, the term "personal car" has fallen under the policy axe. It was a catchy term and caught on so well that other manufacturers began using it. They may have it, says FMC. The new Bird will be identified officially as a "luxury individual car."

In terms of luxury and comfort there is no comparison between the two Birds. The new car's seats are among the best and most comfortable we've ridden upon. Front and rear they are a refinement of the bucket-seat principle, having side bolsters on the seat backs that give firm, embracing, lateral support. The front seats are separately adjustable and the rake of their backs can be varied from near-vertical to some seven degrees tilt. Knee room for back seat passengers is not spacious, but hardly differs from that provided in the standard Ford hardtop.

A high shaft tunnel separates the seats down the car's center line. This inevitable structural element is identified as the car's "console" and has been made to serve every possible functional purpose. In it are mounted ash trays, radio speaker, and controls for power windows, heating, air conditioning . . . all but the last two within easy reach of any of the car's few occupants.



For a small car by Detroit's standards, the engine room is positively cavernous, so this may well become an engine swappers paradise. Header tank, used to reduce radiator height, should be useful for special builders.

Ease of entry and exit — a major cause of complaint in the old Bird—is remarkably good in the new four-seater. Contributing factors here are the widest doors in the industry (over four feet), the step-down floor, and a seat-back on the passenger's side that folds absolutely flat.

While the most important single reason for adopting unit body-frame construction in this case is the achievement of the largest internal space for the given external package, there are other reasons and other advantages. One is the improved stiffness, for a given weight material. The "frame" now runs the full depth and width of the body, giving it greater leverage to resist bending and twisting loads that even an X-frame could give. Without the sub-frame, you sit much closer to the ground and this lowers the center of gravity considerably. A further advantage is the elimination of squeaks and rattles without the need for lots of bits and pieces of rubber. Plenty of undercoating keeps the body from sounding like a big bass drum with you inside of it. The Bird's body, like the new Lincoln's (the Bird is assembled in the Lincoln plant) is *dipped* in rust-preventive bonderizing solution and this gives greater, more thorough penetration than is possible with the conventional spray technique. Unit construction potentially makes possible important weight savings, but in the new

(Continued on page 52)

1958 FORD THUNDERBIRD
PERFORMANCE

TOP SPEED:

Estimated	125 mph

ACCELERATION:

From zero to	Seconds
30 mph	4.3
40 mph	6.3
50 mph	8.2
60 mph	10.4
70 mph	12.8
80 mph	15.6
90 mph	19.2
100 mph	24.4
Standing ¼ mile	17.8
Speed at end of quarter	87 mph

BRAKING EFFICIENCY:

See Chart.

SPECIFICATIONS

POWER UNIT:

Type	V8
Valve Arrangement	pushrod ohv
Bore & Stroke	4.00 x 3.50 in (101.6 x 88.9 mm)
Stroke/Bore Ratio	0.88/1
Displacement	352 cu in (5767 cc)
Compression Ratio	10.2/1
Carburetion by	One four-throat Holley
Max. Power	300 bhp @ 4600 rpm
Max. Torque	395 lbs-ft @ 2800 rpm
Idle Speed	500 rpm

SPEED RANGES IN GEARS:

(Manual)	
I	zero to 45 mph
II	9 to 70 mph
III	12 to top
(Automatic Trans)	
Low I	zero to 41 mph
High I	9 to 68 mph
High II	12 to top

SPEEDOMETER CORRECTION:

Indicated	Actual
30	30
40	39
50	48
60	57
70	66
80	75
90	84
100	93

FUEL CONSUMPTION:

Hard driving	9.2 mpg
Average driving (under 60 mph)	13.8 mpg

DRIVE TRAIN:

Transmission ratios	
(Manual)	
I	2.49
II	1.59
III	1.00
(Automatic)	
Low I	2.40
High I	1.47
High II	1.00
Final drive ratio (test car)	3.10 (automatic)
Other ratio	2.91 (optional), 3.70 (manual and OD)
Axle torque is taken by	Trailing arms

CHASSIS:

Wheelbase	113 in
Front Tread	60 in
Rear Tread	57 in
Suspension, front	Coil springs, unequal wishbones
Suspension, rear	Coil springs, trailing arms
Shock absorbers	Telescopic
Steering type	Recirculating ball and nut
Steering wheel turns L to L.	4.1
Turning diameter	38.5 ft
Brake type	Bendix Duo-Servo with Cerametalix spot insert
Brake lining area	194 sq in
Tire size	8.00 x 14
Rim size	5.5J x 14

GENERAL:

Length	205.4 in
Width	77.0 in
Height	52.5 in
Weight, test car	3870 lb
Weight distribution, F/R	53/47
Weight distribution, F/R, with driver	—
Fuel capacity	20 U. S. gallons

RATING FACTORS:

Bhp per cu in	0.85
Bhp per sq in piston area	2.98
Torque (lb-ft) per cu in	1.12
Pounds per bhp — test car	12.9
Piston speed @ 60 mph	1390 fpm
Piston speed @ max bhp	2680 fpm
Brake lining area per ton (test car)	100 sq in
Mph per 100 rpm	25.2

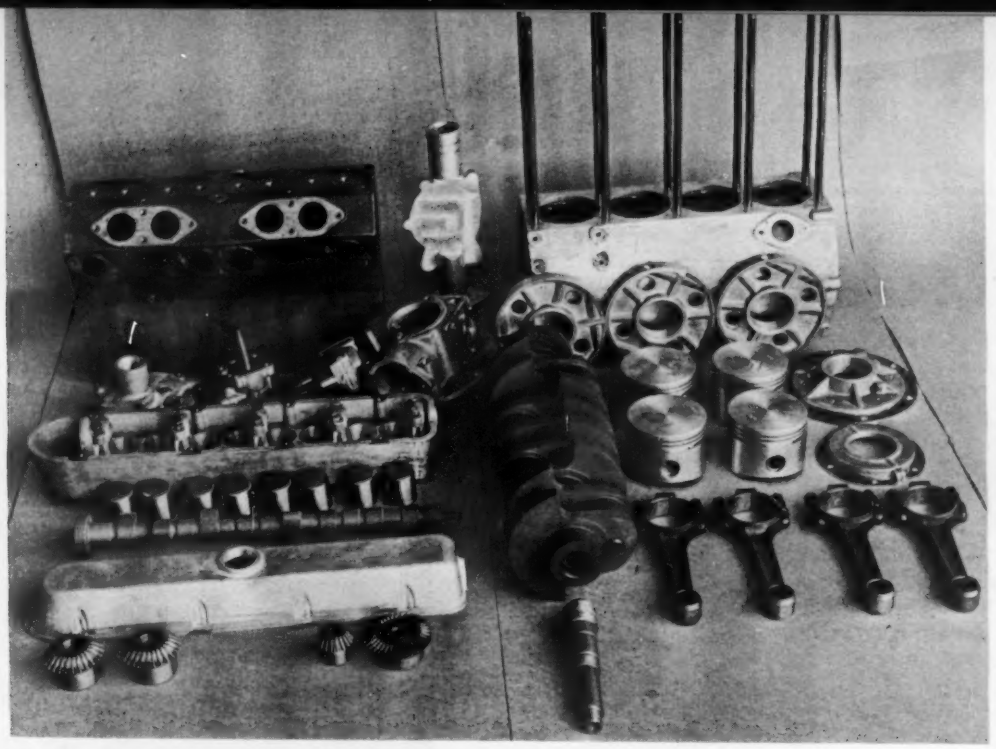
ONE HORSE PER POUND

PART II
Concluded

by OCee Ritch

ALTHOUGH the fabricated steel block of the original Crosley engine was put down as a complete failure by most of the automotive industry, its designer, Lloyd Taylor, was convinced that the *process* on which it was based was sound. Other engine concerns continued to use a hand-welded method of fabrication successfully and, as SCI technical writer Karl Ludvigsen notes in his article on the Mercedes M196 ("Mercedes Hottest Engine" SCI May, 1957): "They (Mercedes) can draw on experience with everything from powerplants to fighter planes and have plenty of time to test out new ideas thoroughly in the racing shop. For this reason their well-tried welded cylinder block construction was resurrected again for the new racing engine. Totally unsuited to mass production, it nevertheless is reasonably light and gives perfect control of wall thickness."

Two points are well brought out here. Hand welded fabrication is time-consuming and therefore costly. But the use of steel plates of accurately-controlled thickness produces walls of even heat-transfer ability, eliminating hot spots and the other headaches of core castings. If, possibly, one could take advantage of the latter without the disadvantage of the former, a new advance would be made in automotive engine design.



In addition to fabricated steel block with integral head, Taylor's Super Sports consists of a variety of special castings, standard American internals, British externals. Latter were chosen to simplify sports car conversions.

In 1946, Lloyd Taylor set up a small shop in the industrial section of Los Angeles to begin work on a new model. It was to be built to rigid specifications, yet involve no hand work in fabrication. Being only partly idealistic and knowing that self-satisfaction won't pay any bills, Lloyd also looked around for an outlet for whatever might emerge from the works. Having had recent bitter experience with big industry, he reasoned that aiming another shot in that direction would be futile. Aircraft builders were pretty well hooked on air-cooling, so he settled on the racing brotherhood as possible customers. Here is a group constantly on the *qui vive* for new developments, and one which demands perfection and doesn't mind paying for it.

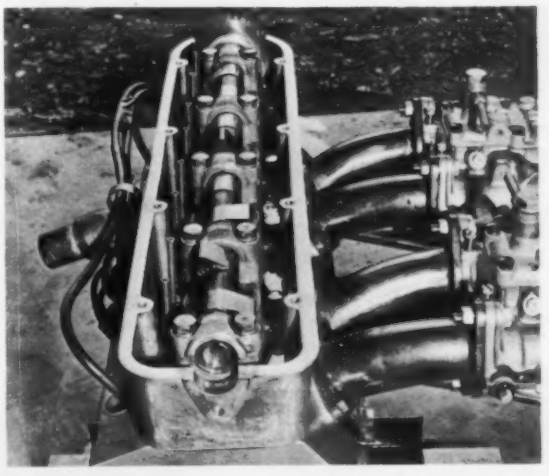
At this period, Los Angeles was being swept by a boom in midget racing. A half-dozen quarter-mile ovals in the area were causing angry protests from sleepless neighbors, and you could attend a midget "go" every night in the week by traveling only across town. This was the era of the Gilmore Gold Cup, the board tracks in the Coliseum and Rose Bowl and the "Big Money". So many races were carded that the URA, the sanctioning organization, divided its cars into "Red" and "Blue" circuits, separating the Offies from the V8-60s and other non-ohc mills.

Competition among drivers was keen but there was little competition for the Offy. This looked like a worthy challenge to Brother Taylor, so he set out to build a 96 cubic-inch two-stick overhead lighter and even more rugged than the redoubtable Meyer-Drake.

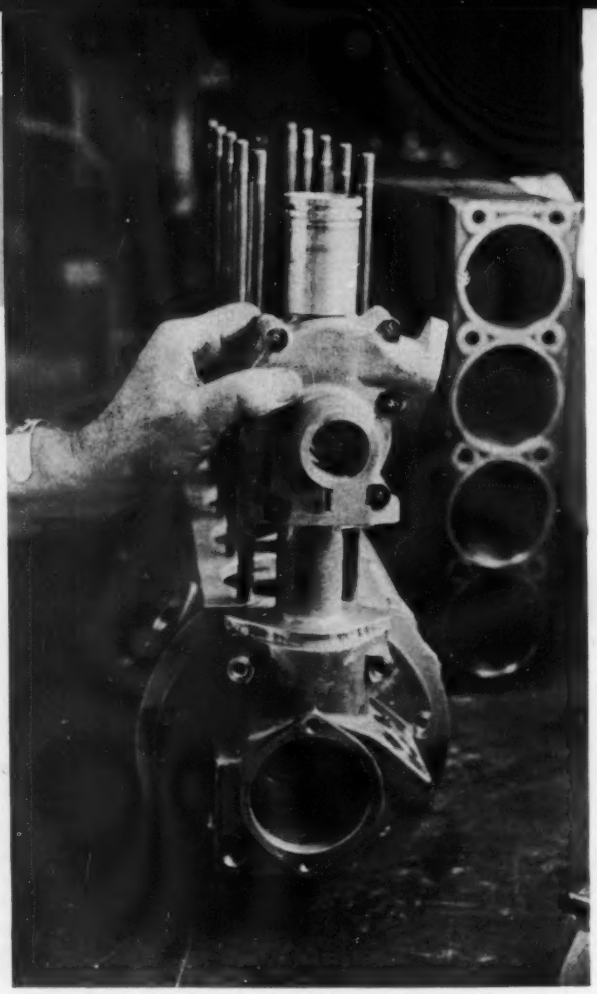
The results of his labors weren't as productive as he had hoped. The midget madness swept through the land like the Asiatic Flu, passed on about as quickly, and left a lot of sick people. By the time Taylor had completed his shop and, working unaided, assembled equipment, had tooling made and produced an engine, the midget market had pretty well disintegrated. Used midgets were for sale at half the filling stations in town. But with the philosophic approach which has carried him through the past 30 years, Lloyd went ahead with experimentation.

About the same time, the Richfield Oil Company was delving into new high-octane fuels and had set up one of the most complete engine analysis labs to be found on the Coast. Upon completion of his double-knocker, these facilities were offered to Lloyd. On the dynamometer at Richfield, the results of many new and interesting ideas were studied, accepted or discarded, and the groundwork was laid for the present Super Sports engine.

LEFT, The Crosley, though similar in layout, differed in bevel drive details and required accurate adjustment.



RIGHT, Taylor's SS features separate ports and easily adjusted bevel drive gear.



Tower shaft to single overhead camshaft (sohc) drives water pump. Preloaded thrust bearing eliminates gear noise when block expands or contracts with temperature changes. A 2nd bevel gear on crankshaft nose drives oil pump, distributor.

The fabricated two-cam 96 had 12/1 compression, developed 90 hp on pump gas and weighed 190 lbs. It was run-in in one to eight-hour periods for 200 hours at full throttle, full load and never faltered. (The same sparkplugs were used during the entire period and were later installed, for luck, in the SS when it was fired up for the first time.) This is about like running your car at top speed for some 20,000 miles, a couple of hundred miles at a time, letting it cool down periodically only to induce maximum wear.

Following this display, Lloyd installed the 96 in his MG TD and drove it daily for another year. Upon disassembly, the engine showed only tolerable wear in cylinders or bearings.

While driving the MG, Lloyd was in the habit of choosing off with others of the breed at the customary stop-light drag strip, and took great delight in storming away to the accompaniment of baffled expressions all around. Taylor avers that he never had an opportunity to unwind the 96, but admits to turning 70 mph in 3rd cog on numerous occasions.

Taylor's more serious experiments might have ended with the midget bust if chance hadn't brought him into contact with his neighbor Orland Wilcox, a young engineer. Fascinated by the story behind the engine in the TD, Wilcox urged Taylor to renew his interest in high-performance mills and to work out new designs for the burgeoning sports car movement.

This combination has proved to be a fruitful one. Certain details of tieing the block to the case had never been solved to Taylor's complete satisfaction, but Wilcox was able to supply a method. Other engineering developments and improvements were forthcoming and patents on a number of unique features have been applied for. A small company was formed and the SS was put into the works. Harry Weber, a pioneer in the hop-up accessory field, is a long-time friend of Lloyd's, and Weber's fully-equipped machine shop, which contains all the necessary mechanical helps vital to building from the bench up, were used for experimental work.

The head-en-bloc design of the SS is not new, but it is one of the soundest approaches to high-output performance. Its disadvantages, when conventionally cast, are largely those of costs. Valve seats and guides are more difficult to insert, an overhead cam arrangement is called for with its attendant drive mechanism, and the need arises for securing the block to the case; all these add up to nearly prohibitive costs.

Its advantages, on the other hand, are important: higher compression is possible without the danger of blown gaskets, and better heat dissipation is obtained through full and continuous water jacket. By using fabricated-steel, the SS at once overcomes the difficulties and takes full advantage of the possibilities.

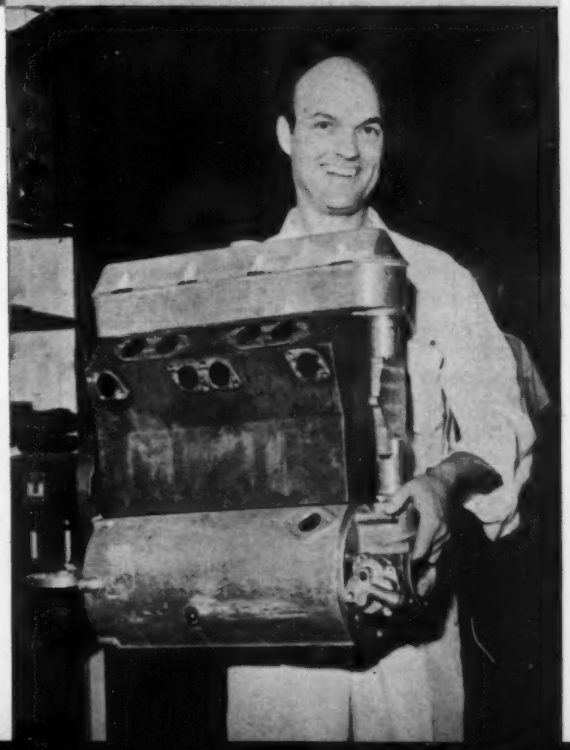
Lloyd Taylor demonstrates insertion of rear main bearing web in cast aluminum crankcase. Center three main webs fit into purposely cracked flanges which are afterwards cinched tight with setscrews. This gives a rigid type of barrel case.

All internal combustion engines are essentially heat engines. The expansion of burning gases in the cylinder drives the piston, which does the useful work. A certain amount of heat is thus transmitted as useable energy, but the remainder is either pushed out during the exhaust stroke or remains in the head and cylinder walls and must be carried away by the coolant, be it air or water. If this remaining heat is not well ducted, the engine overheats, preignition of the gas charge commences and things can come to a smoldering halt. In terms of thermal conductivity coefficient, the heat transfer ability of cast iron is 27, that of steel is 26. When we consider the fact that steel need be

Taylor proudly slips fabricated head-block unit over the long studs which will hold it to the barrel crankcase. Just visible are the spark plug wells at top of block.

Saucer-like cylinder "head" provides wedge type combustion chamber. Fabricated ports can't miss having smooth inner surface. Spark plug insert is still to be added.

Co-designer Orland Wilcox smiles as he lifts what appears to be a complete engine. None of the innards are there so it weighs a good deal less than the expected 180 lbs.



but ⅓ the thickness to render the same design strength, its superiority becomes apparent.

The average wall thickness in a cast block is a quarter inch. It is often thought wise to allow an additional sixteenth for core shift. A fabricated steel unit of comparable strength would be .083 inches thick with safety.

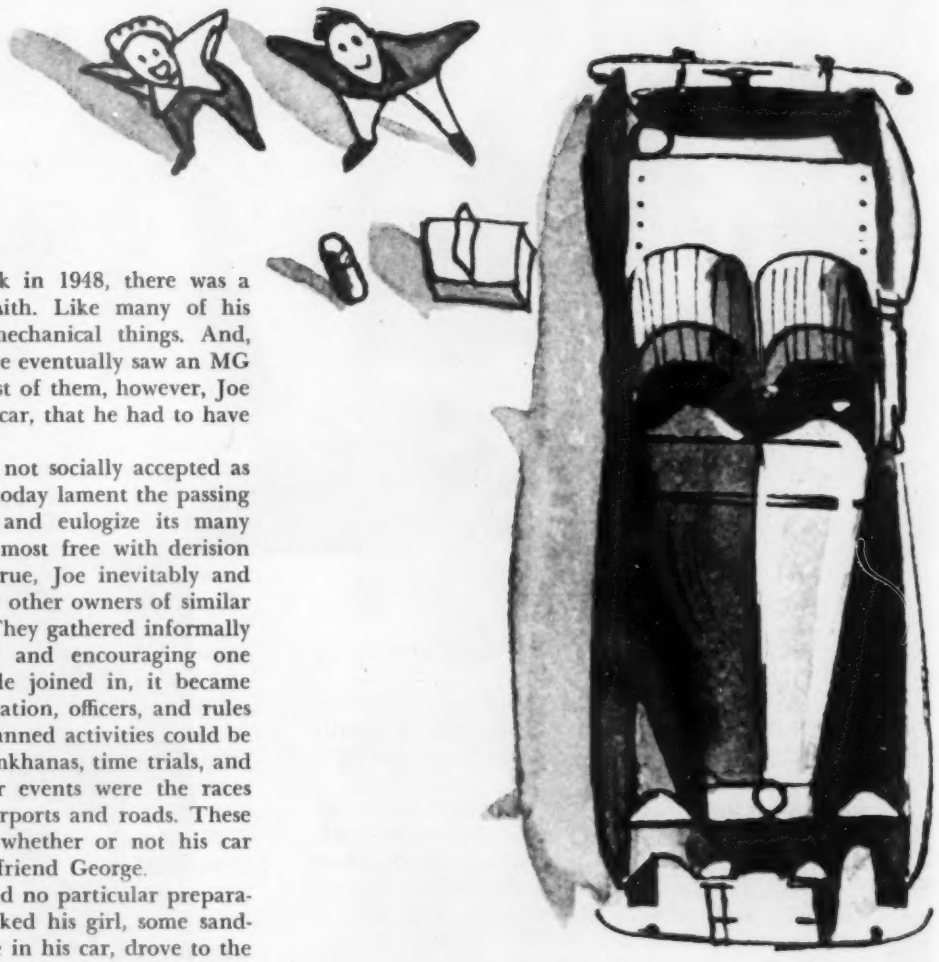
All other things being equal, including power output, the rate of heat dissipation must be the same whether the block is fabricated steel or cast iron. Heat flow is proportional to the thermal conductivity coefficient multiplied by the difference in temperature between the two surfaces and divided by the thickness. In formula form, this appears as $q = \frac{K \cdot \Delta T}{t}$.

(Continued on page 48)

Growth of an Amateur

by Stan Mott

Illustrations: Stan Mott



All they needed was a girl, lunch, and a TC. Next year, Joe brought a spare set of plugs . . .

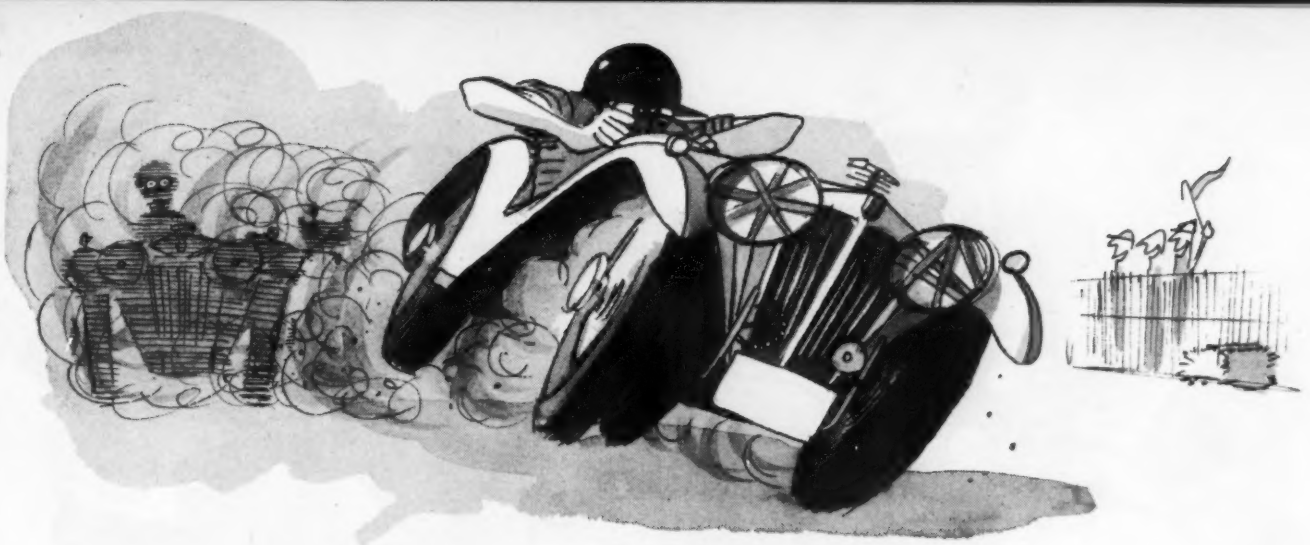
A LONG time ago, 'way back in 1948, there was a young man named Joe Smith. Like many of his contemporaries, he liked mechanical things. And, like many of his contemporaries, Joe eventually saw an MG TC on his city's streets. Unlike most of them, however, Joe knew, the minute he saw the little car, that he had to have one.

In those far off days, TC's were not socially accepted as "smart," and the very people who today lament the passing of that spindly wheeled wonder and eulogize its many virtues, real and imaginary, were most free with derision for Joe and his car. This being true, Joe inevitably and naturally banded together with the other owners of similar cars whom he met at his dealer's. They gathered informally whenever it was possible, aiding and encouraging one another. As more and more people joined in, it became apparent that a club, with organization, officers, and rules would be advantageous, in that planned activities could be carried out. There were rallies, gymkhanas, time trials, and group trips, but the most popular events were the races held occasionally on abandoned airports and roads. These gave Joe the chance to find out whether or not his car really was faster than that of his friend George.

The races were fun; they required no particular preparation or special effort. Joe just packed his girl, some sandwiches, and a thermos of lemonade in his car, drove to the track, unpacked said girl and lunch, raced, beat George, ate the lunch, put the girl back in the car and drove home.

Next year, Joe took along an extra set of spark plugs as insurance and wore a new shiny white crash helmet, but the day wasn't quite so much fun, because good old George had installed a blower on his engine and won everything. This was doubly disturbing to Joe because this time there was a fair-sized crowd present to witness his defeat.

That wouldn't do, of course, so Joe countered by remov-



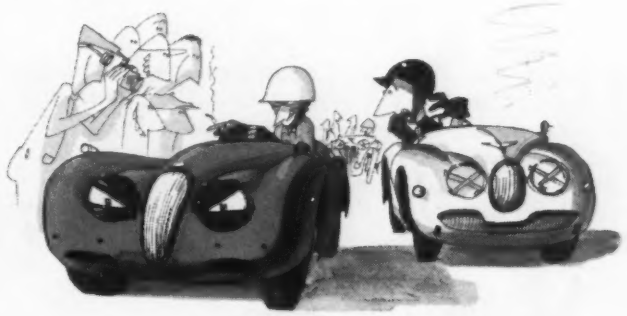
But George had mounted a blower on his TC, and ran away and hid!

ing from his car everything that would come loose. It was more fun than ever. George was vanquished once again, and the hundred dollar tune-up it had taken to do it seemed well worth while.

It seemed less so at the first of the next season, though. George wasn't driving a TC any more; he had a Jowett Javelin Jupiter, and most of the other fellows were driving that new Americanized MG with the baby buggy wheels, the TD model.

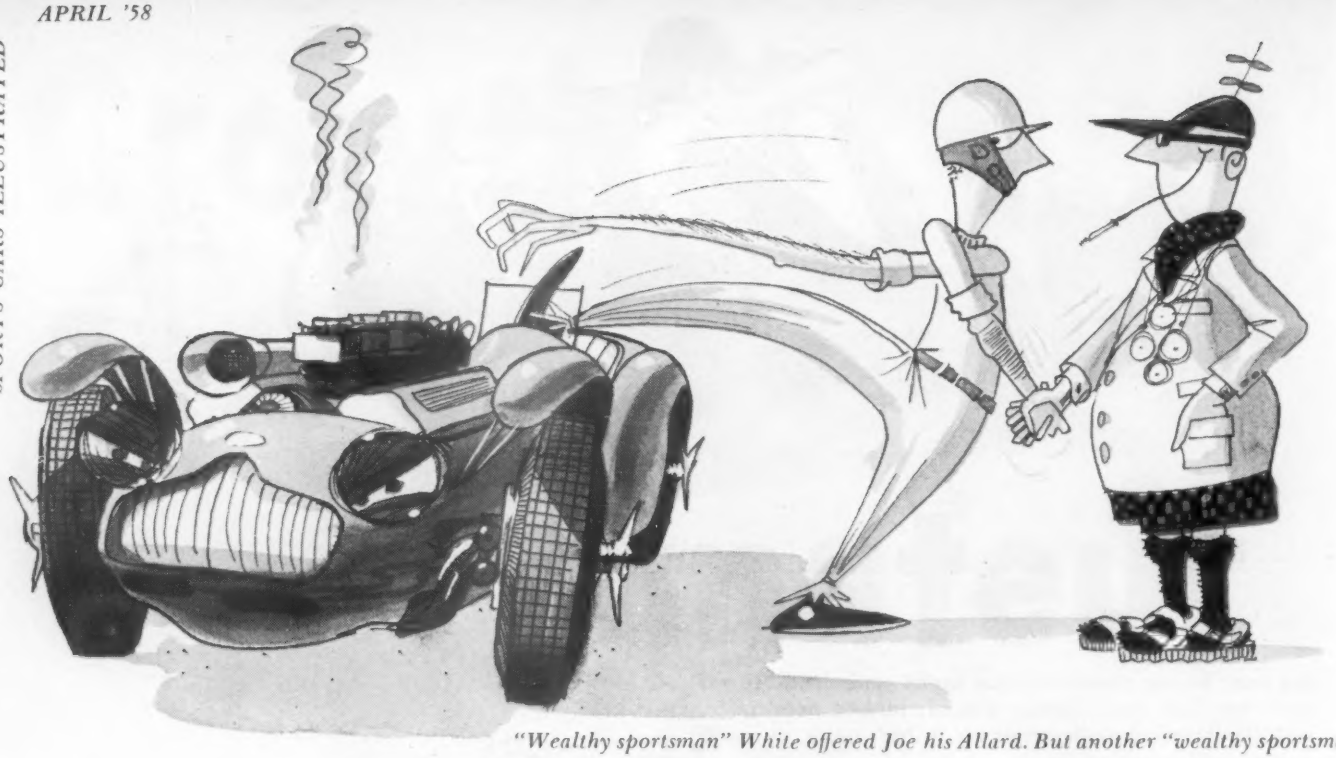
There was only one thing to do, and so, despite the expense involved, Joe bought a Jaguar XK-120. *That* would show George and the boys the short way around, and show the spectators a real car and driver at the same time. And it did, too — for a while. George met the challenge in typical fashion. He bought an XK-120 M.

You can imagine the effect of this on poor Joe. It was no longer a matter of merely winning or not winning a trophy. There was a crowd outside those fences; a gay

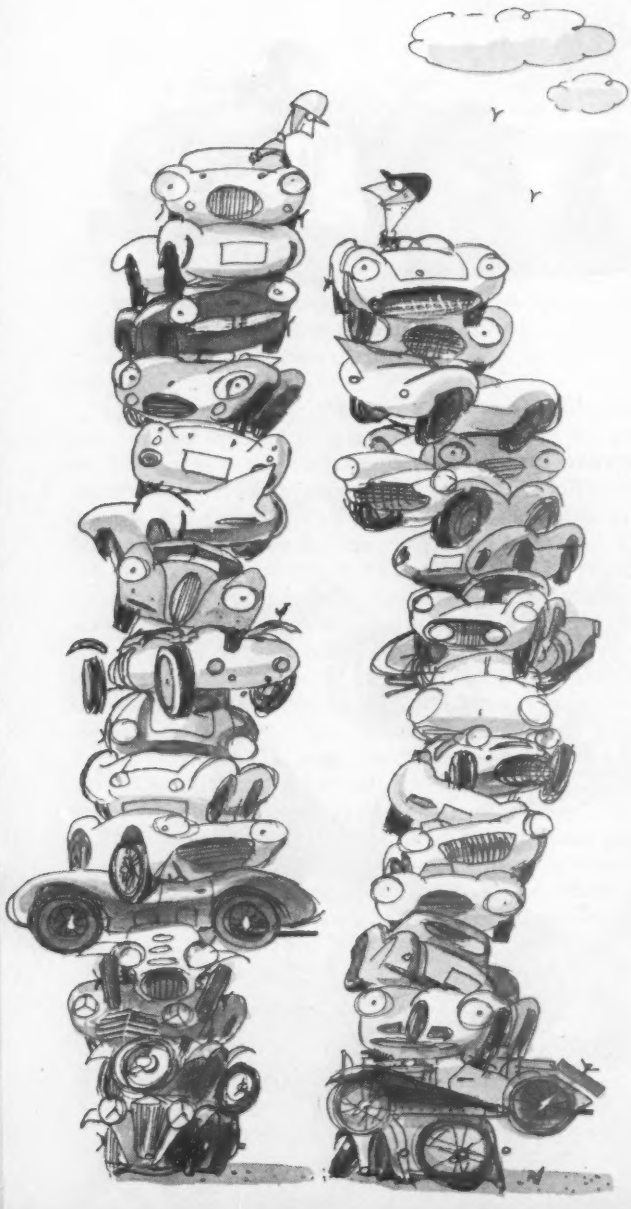


Joe countered with an XK120

To preserve his manly dignity, George met the challenge with an XK120-M.



"Wealthy sportsman" White offered Joe his Allard. But another "wealthy sportsman"



crowd caught up in the social whirl of road racing. To that crowd, in Joe's mind, his honor, his very manhood, was at stake. Yet what could he do? His car was not fast enough; he could afford no faster, and to quit would mean dishonor.

Joe's plight was not unknown, and actually was welcomed by some, notably a Mr. White, who was well known in some circles as a "wealthy sportsman." Mr. White approached Joe with an offer to let him drive a new Allard. Joe was overjoyed at this opportunity, and began driving the Allard with new enthusiasm. George was a menace no longer, at least not until he appeared driving a Mr. Black's 2.0 Ferrari.

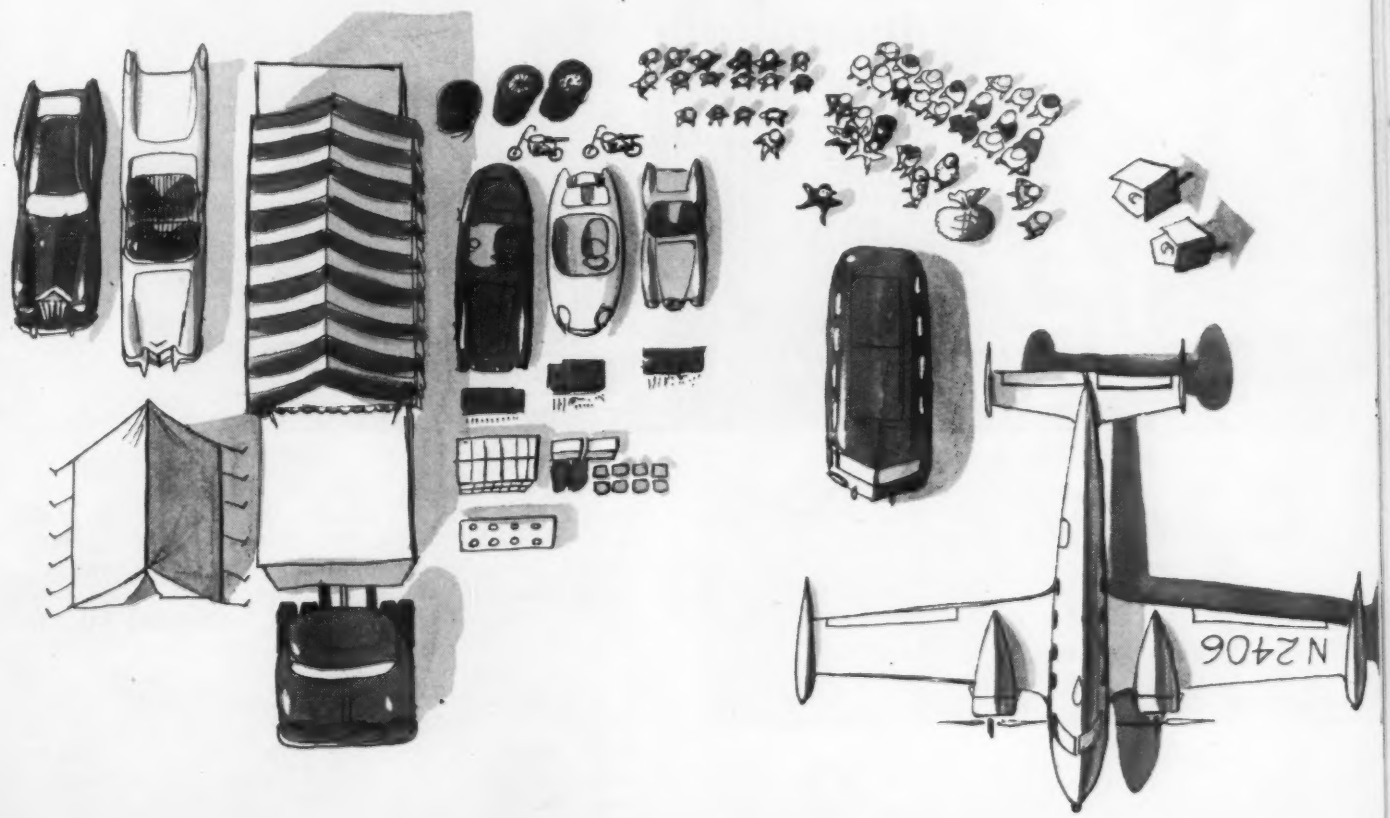
Mr. White's solution? A 2.3 Ferrari for Joe.
Mr. Black bought a 2.6.
Mr. White bought a 2.7.
Mr. Black bought a 2.9.
Mr. White bought a 3.0.
Mr. Black bought a 3.5.
Mr. White bought a 4.1.
Mr. Black bought a 4.4.
Mr. White bought a 4.5.
Mr. Black bought a 4.9.

At a loss for Ferrari, Mr. White switched tactics. He bought a 1500 OSCA.

Joe is happy. He doesn't work any more, but he doesn't miss it; he hasn't spent a dime in years. He's an amateur

bought George a Ferrari. White changed his tactics, bought Joe a 1500 cc Osca.

sportsman full time now. It's just like in the old TC days. Racing doesn't require any particular preparation or special effort. Joe just packs Mr. White, 12 girls, 10 Italian mechanics, 16 scorers and timers, four caterers, three psychiatrists, two pilots, and a public relations man, together with a tent, three tables, 40 spare tires, a machine shop, two ice tubs, a bar, 24 cases of coke, two portable outhouses, 14 folding chairs, two scooters, a Ferrari, a Porsche, an OSCA, and a 10-pound bag of spare cash into a van trailer, a VW bus, a Cadillac Eldorado, a Bentley Continental, and a twin engined airplane and goes to the track. There he sets up his settlement, and wins the race. (Unless George does . . .).



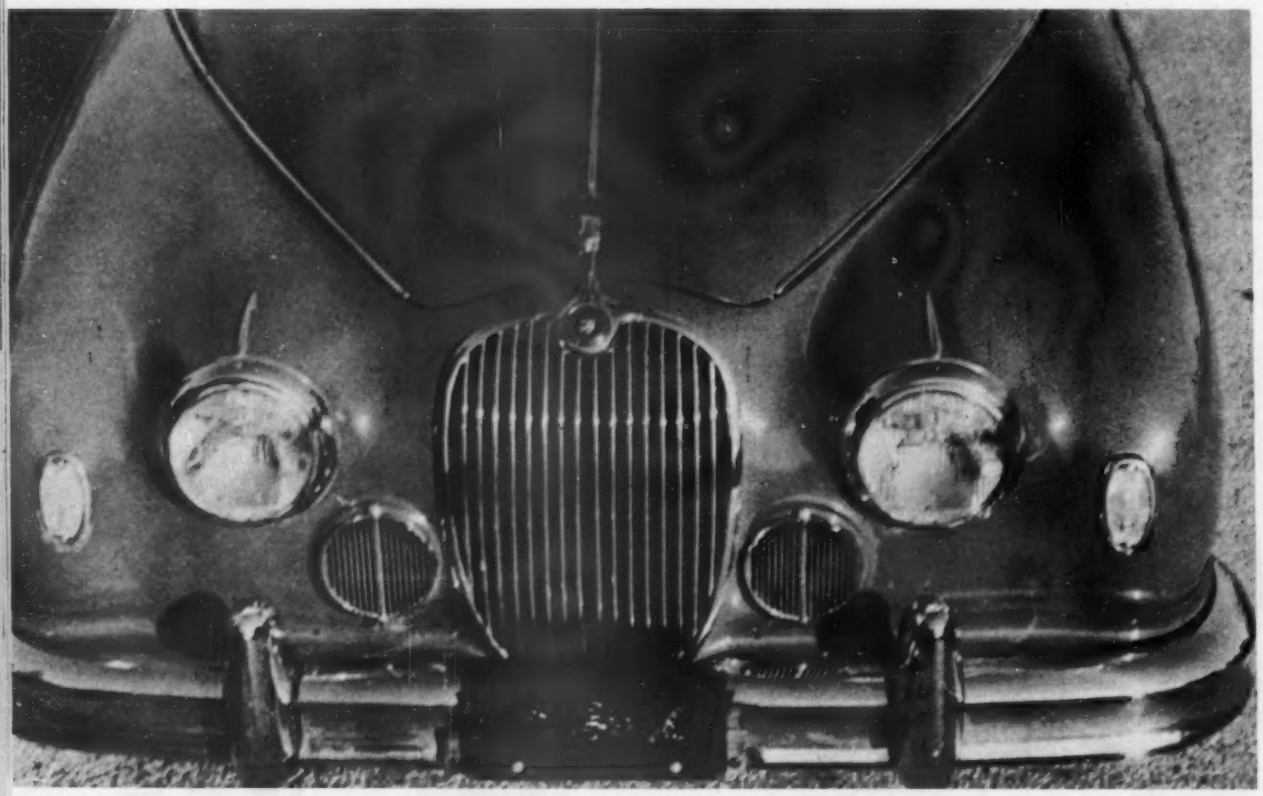
SCI ROAD TEST

3.4 JAGUAR SEDAN

IT'S EASY to understand why Jaguars dominate Le Mans: even Jaguar saloons handle like sports cars, though in the truest sense of the word they aren't. The 3.4 sedan sums up luxury touring in a high-speed car that defies comparison. It certainly has no exact American counterpart, the Fury, perhaps, comes closest. Of course, Jaguar owners expect to *go*, but here's a four-door sedan—family sedan, if you wish—that accelerates and cruises with *very hot* super-stock American sedans, even though the engine is half their displacement.

Our test 3.4 was black, contrasted by white-walled Dunlop Road Speeds and red leather interior appointments, and equipped with a stick shift and overdrive. Four-wheel disc-brakes are standard equipment. When we received it from Mr. Bottrill of Jaguar Cars North American, it seemed almost a shame to take such pretty equipment out on the road; but accelerating easily from our first traffic light, we knew that motoring is what this car is made for. The sedan version of the justly famous Jaguar engine, respected wherever good race cars gather, is both smooth and powerful in close traffic or on open roads.

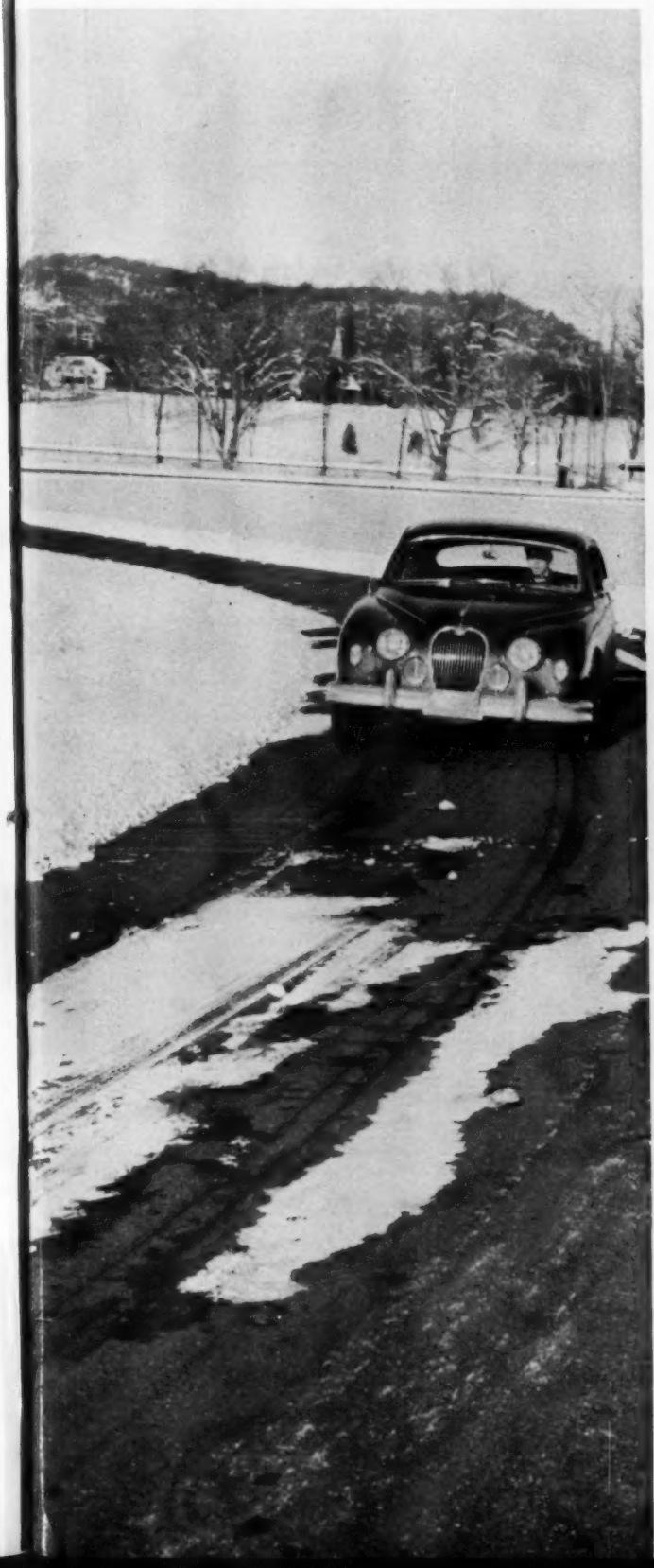
Chatting with Mr. Bottrill, we touched on the subject of D-typing the 3.4. He told us that it is impossible to go all-out, as there just isn't sufficient room between the engine and the fender for the three Webers. However, breathes there a man with so much fire in his soul that he wants more *go*, it is possible to install the "red" head with bigger valves and shorter guides, 9 to 1 pistons, larger-throat S.U.'s and suitable ignition. But from where we sit, you'd have to be a man in a real hurry to bother.



Uncluttered, aerodynamic lines indicate that the crouching jaguar on hood has plenty of muscles to use. Styling, both inside and out, is the essence of function and good taste.

The day of our performance testing was very cold. The sedan had spent the night parked in the Connecticut outdoors, and as we pressed the starter button, we would not have been at all surprised if the engine had resented the cold. But the electric chokes on the dual S.U.'s gave just the right mixture. Four turns of the starter, and the engine was under its own power.

Already splattered with road mud, we took a turn around a partially plowed Lime Rock. Snow patches made for rough going on the "S," but the Jag responded to every request.



XK engines obviously receive many, many dedicated man-hours in their manufacture. The dohc mechanism has every right in the world to be noisy; however, driving home the previous night, we were impressed by the absence of clatter and vibration. At Coventry, each moving part is meticulously mated with its corresponding surface, and tolerances are established for running temperatures. When the engine is cold and void of oil films, things like the chain-driven cams make themselves heard. It's a moment of appreciation that doesn't last too long, for after only a few seconds, cushions of oil form very effective dampers, the chokes open up, and the engine settles to a quiet 600 rpm idle. Without the instruments, you can not be sure your engine is turning over.

But turn over it does—right up to 6000 rpm. This engine likes to work at the top half of its range. There's plenty below the 3000 peg, but when the needle starts down the right side of the tach, the muscles of the crouching cat really begin to ripple. The car is deceivingly smooth at high speed, and a glance at the speedo gives quite a shock. All of a sudden you're doing ninety! It's no problem to get up to sixty in second slot, and eighty comes real easy in third. And, with overdrive, there are still *two* gears to go! Cruising speed is whatever you want to do. We tried eighty over icy roads and had no trouble whatsoever. There's no wind or engine noise, and the heater keeps you warm and comfortable.

The foot pedals are the conventional clutch, brake and accelerator, located right where you would expect to find them. The hydraulically actuated Borg and Beck clutch operates easily and freely. It's easily engaged, and holds everything the engine can pour into it. And this engine produces plenty of power, even at the low end.

The gearbox requires getting used to. Pulling away from our first traffic light, we went from low gear into second, or rather, what we thought was second. It was neutral. There's quite a distance to go between the gears on the top of the "H" pattern and those on the bottom. If you make the mistake of rearing way back in the seats as you drive, you'll have to reach out for the shifting lever. We also had difficulty down-shifting into second cog—you just can't seem to find it—as the reverse gate tends to get in the way. Reverse is engaged by a not-too-sharp thrust leftward on the lever, then up. Speed shifing is frustrating at first, but after a short time, we knew the box and worked it with dexterity. We made a practice of downshifting, when in heavy traffic, into first without gear clash.

But whatever the inconveniences of working the manual shift, it is worth the effort in the acceleration department. The automatic transmission is the thing for city traffic, but the price that must be paid is deducted in acceleration times.

Since the plow disregarded the "line," we had to make one of our own, kicking even more snow onto the track. The faster we went, the better the road manners of the 3.4 felt to us.

For example, with the stick shift, we accelerated to thirty in two seconds less time; sixty in 1.9 seconds less; and eighty in 1.1 seconds less.

The brakes are phenomenal: they are, without exception, the finest brakes we have ever found as a production item on a sedan! The four-wheel disc units have stopping power and stamina that repeatedly crash-stop from 60 mph, and are impossible to break down or noticeably deteriorate.

Our test team really unleashed the stresses and strains. Because of the Jaguar's rapid acceleration, we made ten panic stops from sixty miles per hour in less than 200 seconds! As soon as one stop was completed, the car is immediately run back up to sixty, without even waiting for the decelerometer readings to be recorded (they are recorded on the run). We repeatedly made zero-to-sixty acceleration times in under ten seconds. This didn't give the brakes much time to cool, but on the tenth stop, we recorded the *same level of efficiency* as we registered with the first stop. All stops were at slightly better than ⅔ g, and we finished with a pedal loss of less than one half inch amid the stench of hard-worked friction pads.

Very little pedal pressure is needed with the servo assist. Merely resting the tip of the foot on the pedal will bring the Jaguar to a halt from low speed; only slightly more is required from the higher ranges. It's a very smooth operation. The potency is amazing; even on icy roads, the pressure on the discs is so balanced that straight stopping is effected every time, under all conditions. We said previously that you can

Very little space is wasted under the hood, especially where compartment narrows at radiator end. Air filter must be removed to change plugs, but all adjustments to the twin S.U. carburetors are made from the top.

For a car that rides as softly as it does, the Jaguar sedan is a surprisingly stiff automobile on the curves. Under hard cornering, body lean is negligible, imperceptible to driver.

cruise at whatever speed you choose; we say now that you can stop regardless of how you choose to speed.

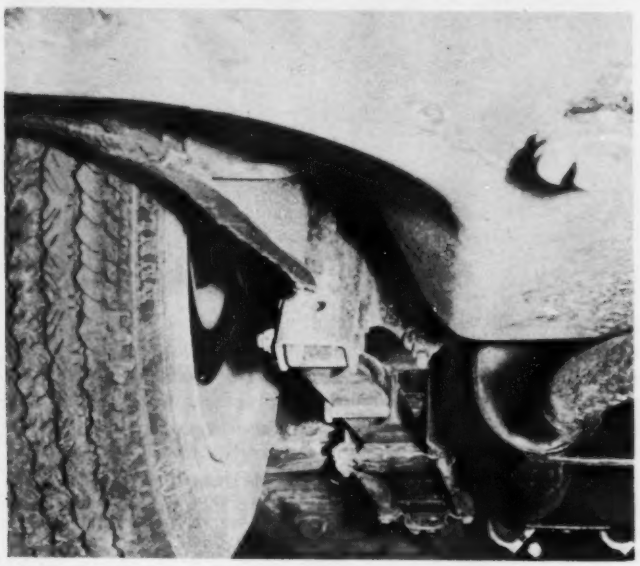
Handling the Jaguar is another pleasure. Tracking on the straights is perfect; it isn't necessary to clench the wheel, but merely to hold it with the tips of the fingers. By boring through a bend under power, you can get the tail to go out, but it only goes out if you want it to, and it's controllable when it does. By applying just the right amount of power you can set up any kind of drift you want, and if you start to get over your head, backing off the accelerator brings the tail right behind the front. Under hard cornering, very little lean is perceptible to observers, and none to the driver. Tire noise is nil, unless you really push the car into very big slip angles. And if you should hit bumps in the middle of your curve, you probably wouldn't even feel it. It's the kind of car that makes you feel you can do no wrong, and chances are you can't, if you use any kind of discretion.

Of course, we tend to be sadly lacking in this department ourselves. A goodly amount of snow had fallen the day before, so venturing a phone call to John Fitch, we were informed that Lime Rock had been plowed. When we arrived we discovered that the plow had made one pass, leaving only a semi-snowy ribbon of black top for our maneuverability runs. And we doubt very much that the driver of the plow had seriously concerned himself with the correct "line" through the turns.

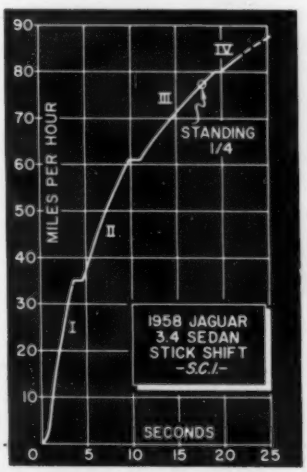
Nonetheless, off we went. Starting gear, fifty-five in second, then to third and into the "S" turn. We turned smoothly,

(Continued on page 52)

Our test machine was black, red leather over foam-rubber bench-type rear seat, bucket-type front seats. Lateral support excellent; we drove for hours over bad road without fatigue.



Quarter-elliptics are out of the vintage sports car era, but with a panhard rod for sideways location, they reappear in modern guise and give a smooth, jounce-free ride.



JAGUAR 3.4 SEDAN
MANUAL TRANSMISSION

PERFORMANCE

TOP SPEED:

Estimated	120 mph

ACCELERATION:

From zero to	seconds
30 mph	3.0
40 mph	5.4
50 mph	7.2
60 mph	9.5
70 mph	14.4
80 mph	19.3
Standing ¼ mile	17.8
Speed at end of quarter	77 mph

SPEED RANGES IN GEARS:

I	0-35 mph
II	7-61 mph
III	10-80 mph
IV	15-top

SPEEDOMETER CORRECTION:

Indicated	Actual
20	22
30	30
40	39
50	47
60	56
70	66
75	71

FUEL CONSUMPTION:

Overall (including testing)	16.9 mpg

BRAKING EFFICIENCY:

10 successive emergency stops from 60 mph, just short of locking wheels were made at 0.7 g. There was no noticeable additional pedal pressure needed. Pedal loss was less than one-half inch.

SPECIFICATIONS

POWER UNIT:

Type	in-line 6
Valve Arrangement	dohc
Bore & Stroke	3.27 x 4.17 in (83 x 106 mm)
Stroke/Bore Ratio	1.28/1
Displacement	210 cu in (3442 cc)
Compression Ratio	8/1
Carburetion by	Two S.U. H.D. 6 (1¾ in throat)
Max. Power	210 bhp @ 5500 rpm
Max. Torque	215 lb-ft. @ 3000 rpm
Idle Speed	600 rpm

DRIVE TRAIN:

Transmission ratios	
I	3.39
II	1.86
III	1.28
IV	1.00
Final drive ratio (test car)	3.77 (2.93 in O.D.)

Axle torque taken by radius arms and quarter elliptic springs.

CHASSIS:

Wheelbase	107.4 in.
Front Tread	54.7 in.
Rear Tread	50.5 in.
Suspension, front	Coil spring & wishbone
Suspension, rear	Quarter-elliptic leaf spring
Shock absorbers	Telescopic
Steering type	Burman Recirculating Ball
Steering wheel turns L to L	4½ turns (ratio 17.6/1)
Turning diameter	34.75 ft
Brake type	Dunlop 12 in disc, Servo assist
Brake lining area	31.8 sq in.
Tire size	6.40 x 15

GENERAL:

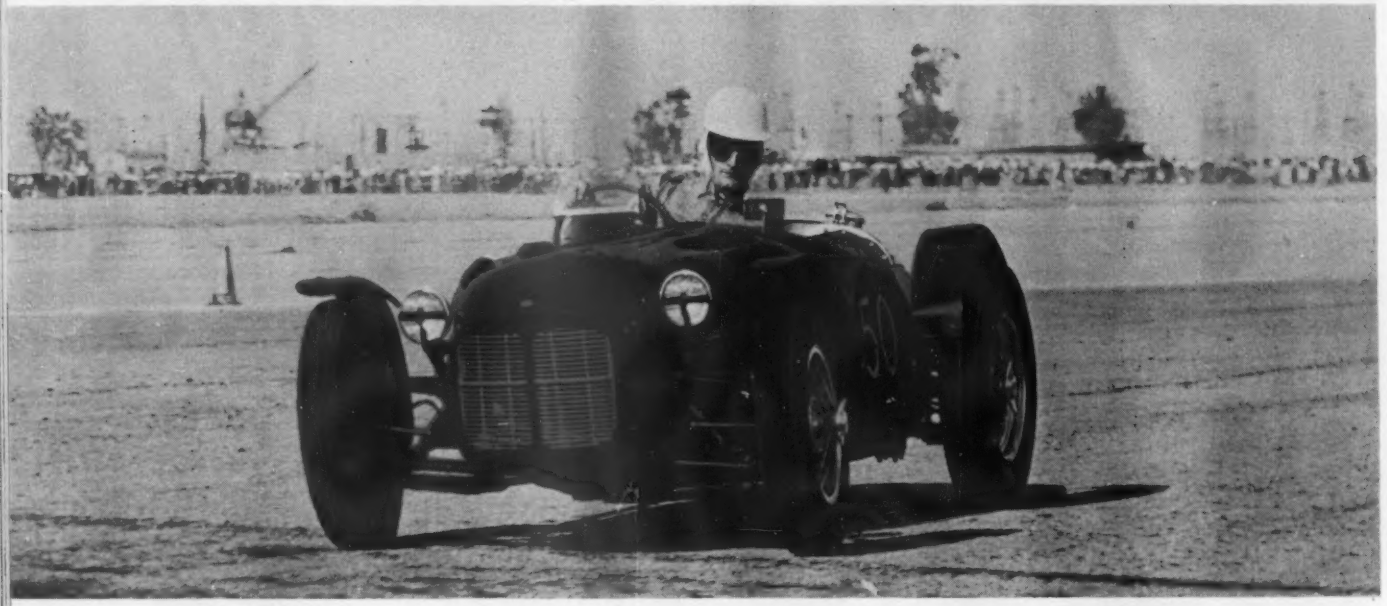
Length	182 in.
Width	66 in.
Height	56 in.
Weight, test car	3250 (half tank of fuel)
Weight distribution, F/R	43/57
Weight distribution, F/R, with driver	43.5/56.5
Fuel capacity	15 U. S. gallons

RATING FACTORS:

Bhp per cu. in.	1.0
Bhp per sq. in. piston area	4.18
Torque (lb-ft) per cu. in.	1.02
Pounds per bhp-test car	15.43
Piston speed @ 60 mph	2055 fpm
Piston speed @ max bhp	3820 fpm

Designing and bolting together a sports car is not a casual undertaking but by taking stock of your assets and some careful thought a class winner can be made at home. Ken Miles tells how to...

BUILD IT RIGHT



PART I
By Ken Miles

Editor's Note: If anybody is qualified to tell our readers how to build a successful special that man is Ken Miles. Many readers will remember how Ken took up the challenge from the world's most successful under-1500 sports cars and whipped them hands down with a dual succession of MG based specials, becoming the nation's "Mr. MG" in the process. Since that time Ken has assisted in the building of two other cars, both successful. Here, he gives SCI's readers a thoughtful analysis of how this string of successes was accomplished and the pitfalls to be avoided by those who would strive to equal his record.

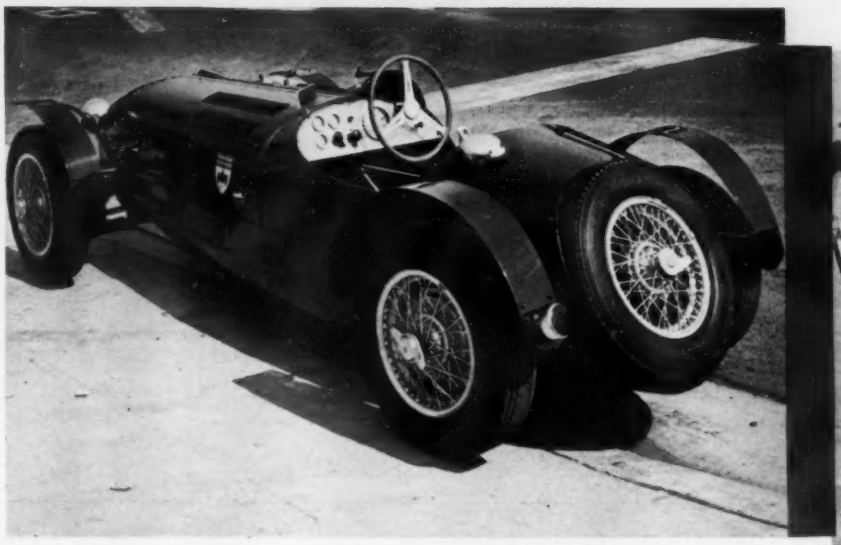
WHY do people build what are commonly known as "Specials"? Why, when there are cars of every conceivable shape, size, displacement class, price and prestige readily available for purchase to suit every possible need or fancy, for the hottest competition or the greatest luxury, would a man go out and sweat blood and tears, strain his imagination and his relations with his family, ruin his bank balance and his health to build a car to his own specifications, or, more usually, a specification thrust upon him by his friends, the magazines that he reads or the current trend of automotive fashion.

Certainly many of the "Specials" that I have seen have been a tragic and expensive mistake; for the cost, in money alone, disregarding the investment of time and energy, the builder could have bought himself a properly constructed car of superior performance, for unless you are endowed with an unusual degree of practical engineering skill, have an unlimited amount of spare time and excellent facilities for getting things done for free, it is illogical to assume that you can build a piece of machinery on a "one off" basis cheaper than a factory can produce the same thing in reasonable quantity. Furthermore, labor in this country, machine shop time, body panelling, and other work that the average special builder cannot do himself is the most expensive in the world.

It is absolutely and regrettably true that speed costs money, and the more money you are prepared to spend, the faster car you are liable to produce. Since high speed automobiles are essentially a limited production item incorporating an immense amount of hand labor, the best buy for your dollar is a car built by a firm specializing in this type of car located in a country where labor costs are a minimum.

All this must be perfectly obvious to anybody who is ambitious enough to contemplate the manufacture of a car of his own, yet still the specials appear, so there must be some other reason than mere economics. In some cases the reason is obviously political; you cannot very well earn your living selling M.G.s and race a Porsche; in others, the designer-constructor is anxious to try out his own solution to the many problems that confront him, but in by far the majority of cases the potential builder said to himself "I have lots of spare time, I have a nice little workshop, I love sports car racing, let's build a Special." If, at this stage, our budding race car manufacturer would sit down and think a little about the project before he starts cutting metal he would save himself a lot of time, money and anxiety.

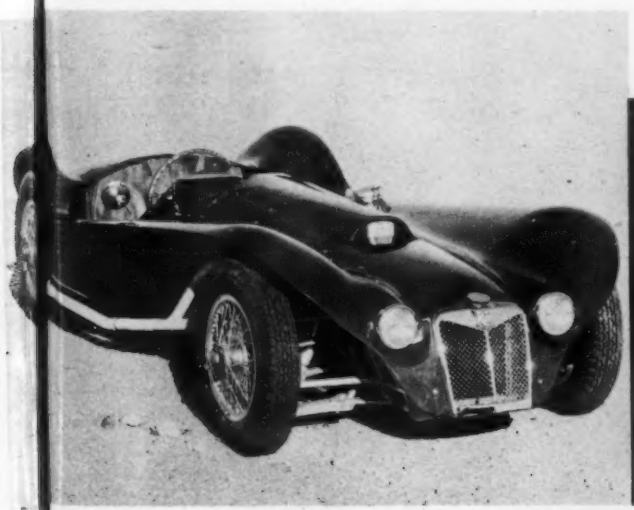
First of all, let's consider the object of exercise. Are you going to try to build a car that will win overall against any opposition, or one that will win within its own class? Are we trying to build a car far superior to its competitors, or are we hoping to build a car that is just as good as the opposition, costs far less to build and will win by virtue of our superior driving skill...



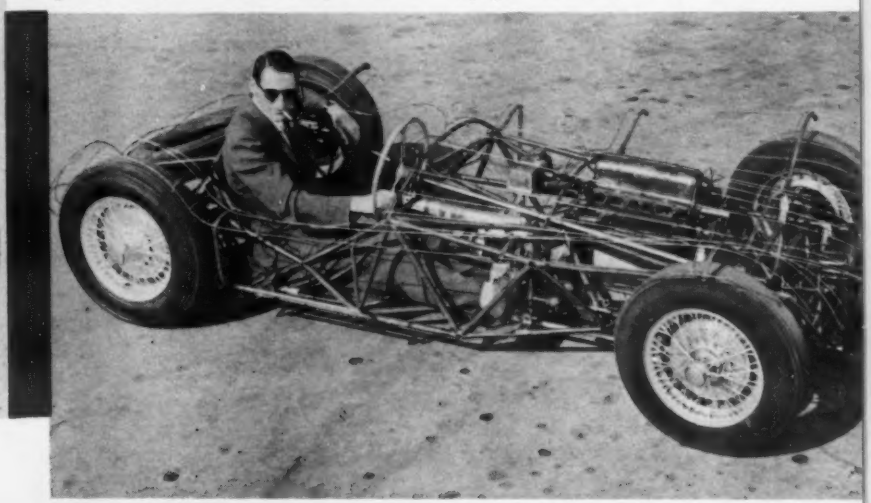
The first Miles special, the R-1, is a fine example of the use of the ladder-type, large diameter tube frame, with the attendant advantages (simplicity) and disadvantages (body framework requirements). Running gear was essentially Nuffield.

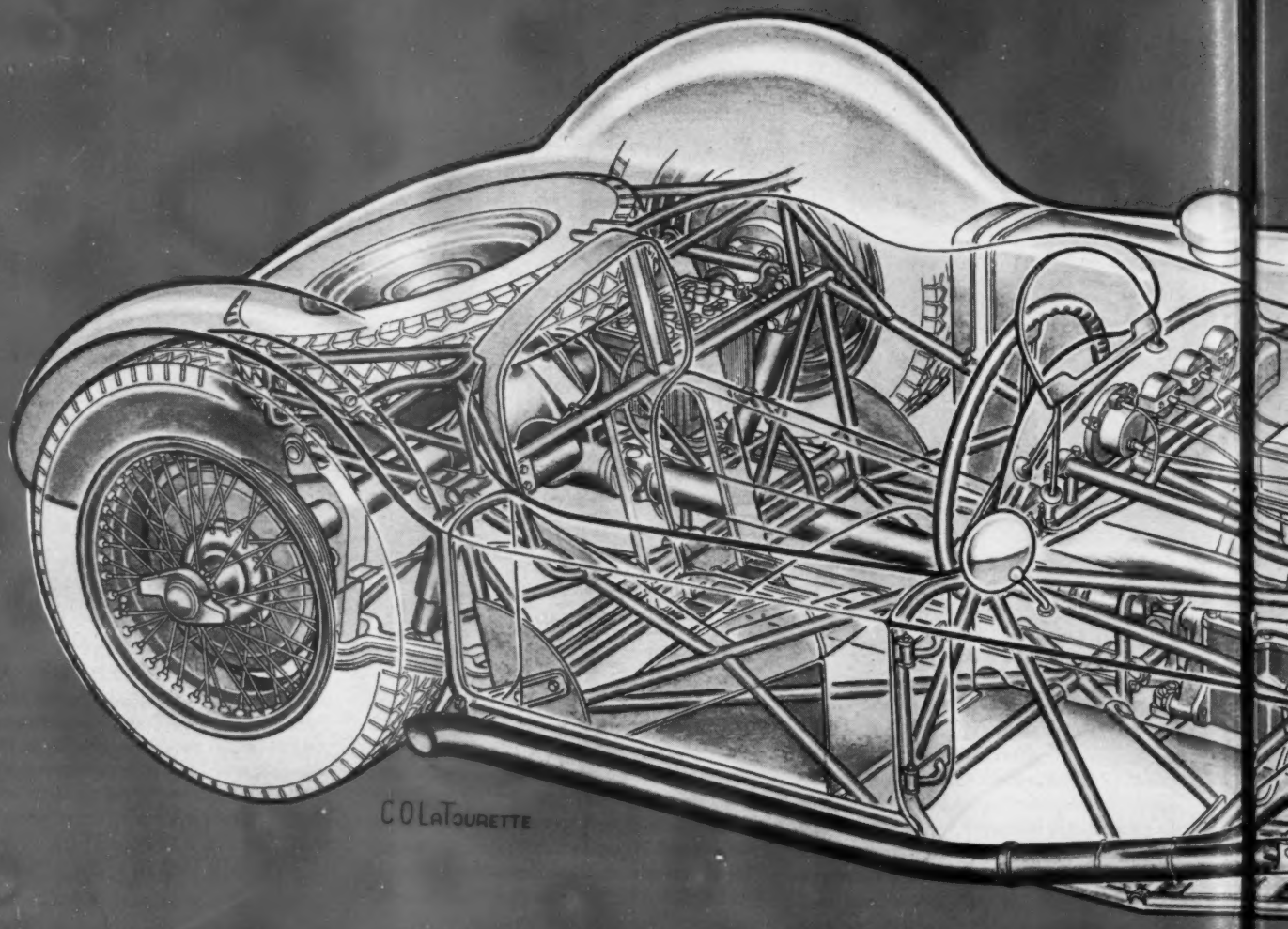
we hope! Or are we building it primarily for the sake of exercising our own ingenuity and only incidentally hoping that it will prove better than the others in its class? This question can only be answered by the builder with reference to the facilities available. The quality of the finished product is going to be related directly to the amount of engineering skill, time, imagination and money that is lavished upon it. A shortage of any of these essentials can usually be counterbalanced to some degree by an unusual abundance of another: if you have lots of skill you can devise economical ways of making things; if you have lots of time you can do things yourself that would generally be considered the job of an expert; and if you have enough money you can buy skill, time and imagination.

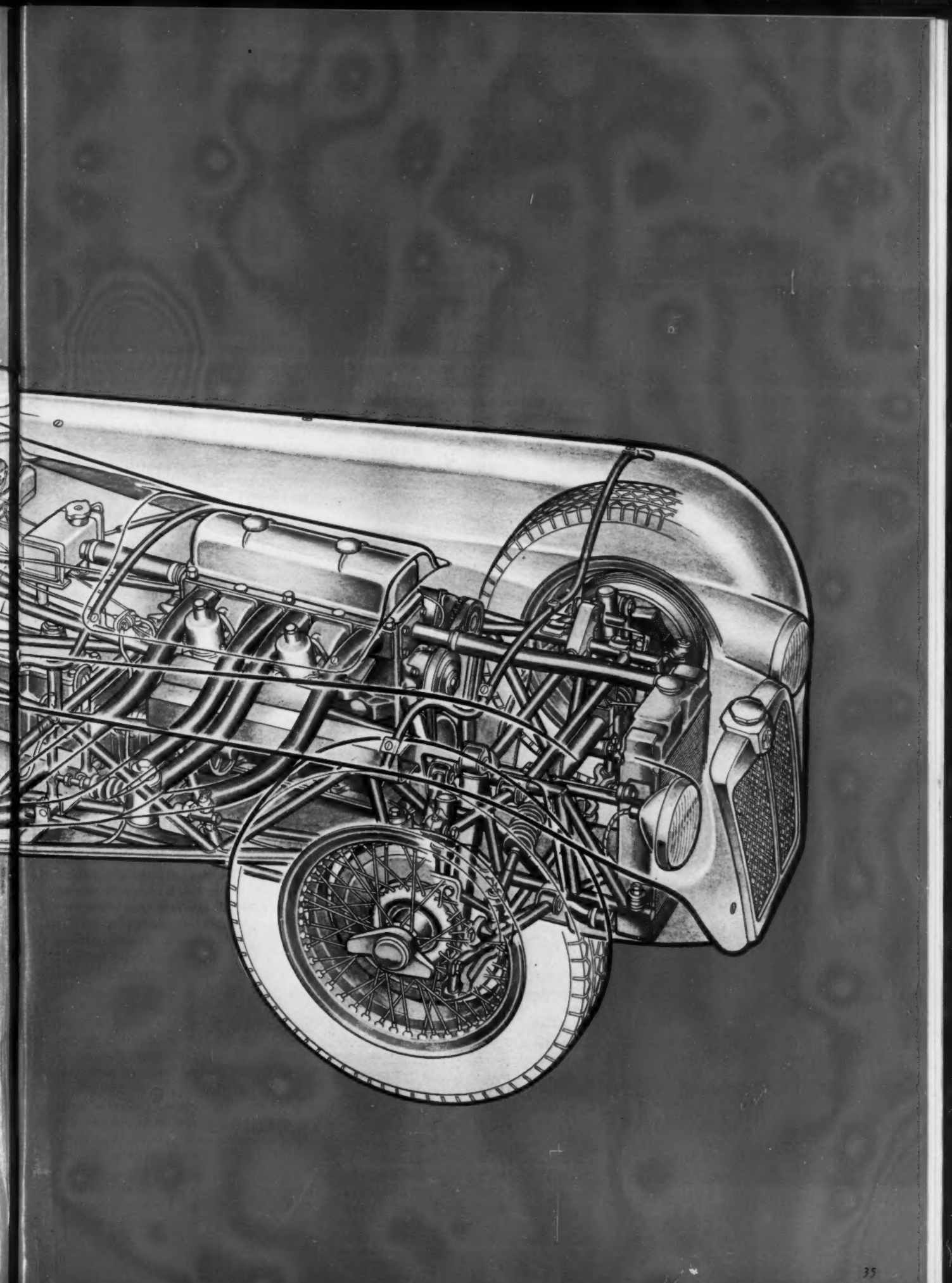
Most specials seem to be built on a relatively limited financial budget, ingenuity and time being in good supply and expected to substitute for money, so the very first thing to do is to examine the racing picture as it stands, see what cars are winning races, and why, and try to estimate where our proposed masterpiece will fit into the picture. If we are setting out to build ourselves a winning car we should ask ourselves, "What will our car have that the winning cars do not enjoy? Why should our car beat them?" Now there are only a limited number of reasons why a car will lap a circuit faster than the next one; either it has more power, by which we mean not necessarily a higher ultimate power output but a better overall power curve, less weight, better brakes, greater aerodynamic efficiency or superior roadholding. Sometimes a consistently successful car will have an overwhelming superiority in one particular or another but more usually they enjoy a slight advantage in almost all respects. No car is ideally suited to every possible type of course, and if your intention is to race chiefly on courses within the USA, then you can build a car that is suitable primarily for American courses and it will have a definite edge over cars built for general use. Most courses in this country are, relatively speaking, slow courses, inasmuch as they incorporate few turns that can be taken at speeds in excess of 100 mph and fairly short straights. Most of the turns will be taken at speeds in the region of 50 to 70 mph with a few as low as 30 mph, so that cornering ability in the 30 mph to 80 mph range will be much more important than good controllability in a 120 mph turn. A car set up to handle well in a 120 mph turn is



The author's second effort was much more ambitious than his first. His R-2, with its small tube space frame and shortened-sump XPEG MG engine, carried an attractively unusual body, yet looked more like an MG.




COLaTourette



Meticulous attention to even the tiniest of details is one factor of successful designs. For instance, the brake pedal's position must suit the driver's requirements. The problem is where to attach it to the frame. Ken used simple brackets and a very short pedal shaft.

usually pretty miserable in a slow turn and vice versa. But by a study of the consistent winners you should be able to assess the reason for their success, and their weaknesses, and if it is not possible to build a car with more of their advantages it might be possible to build one with fewer weaknesses.

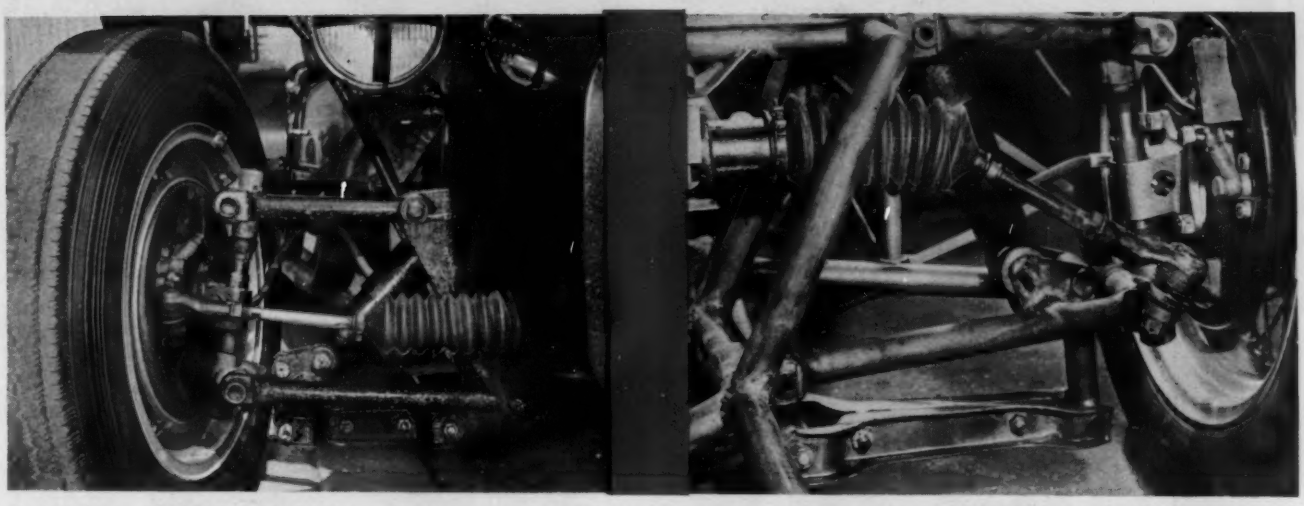
Remember that there is nothing that has not been tried before, at least once, and the reasons for ab ndoning the idea might not apply in your case. You can learn an awful lot about building a car by watching the mistakes that are made by others. This does not only apply to unsuccessful designs; some of the most successful cars are good in spite of quite serious design defects. You should not copy every feature of a car just because it happens to be a winning car; try to see what particular features of its design make it successful and copy only those. Where the products of the larger manufacturers are concerned, bear in mind that company policy often dictates what the designer may or may not use, and left to himself, the designer might have come up with an entirely different plan. Sales and production departments often insist that notable features of the production car be incorporated into the design of the racing car, to the extreme dismay of the racing department. From my own observation, I would say that most of the difficulties that the builders of specials have had with their cars could have been avoided if the designer had studied even an elementary book on automobile design and understood the basic engineering principles involved.

In laying down the specification for your car a compromise has to be drawn between what you would like to do and what is possible with the resources in money, time and skill available. Generally speaking, it is much better to execute a simple design well than a complicated one badly; the more complicated the design and the greater its promise of success the higher degree of skill required to execute it. There used to be a well known formula for success in specials which went "Simplificate, and add Lightness". Though somewhat of a contradiction in terms, for reasons that we will discuss later, it none the less expresses an idea—a machine as light and uncomplicated as possible.

Simplicity is in itself a primary goal, since the more complicated the design the greater the cost, but simplicity must sometimes be subordinated to efficiency, efficiency to weight and weight to cost, so that all design is essentially a compromise. A case in point is the rear axle. Almost everybody will agree that the most efficient type of rear end is one where the wheels are suspended independently, but most independent rear end systems entail a weight penalty and a vast increase in complication. In some cases it is better for the special builder to use the simple and reliable live axle rather than embarking on the complication and dubious advantages of the independent system.

Durability has to be considered. The ideal racing car is one which is just strong enough to cross the finish line in one piece, having won the race, disintegrating immediately thereafter, but maintaining a car of this type becomes rather a problem. On the other hand, the total mileage that a racing car will cover during the season is relatively small, so there is no need for it to be built like a truck. The ease with which the car can be maintained is often a very important factor in its continuing success; there is an obvious reluctance to embark on maintenance projects that are inordinately difficult, and many a race has been lost because "We can check that over next time." And next time was too late. You should bear in mind when you lay out the design of your car that there is no part of it that never requires attention. For the same reason it is impossible to emphasize too strongly the advantages that accrue from the use wherever possible of stock component parts that can be purchased "off the shelf", even if they have to be incorporated into highly non-stock assemblies. Your production components are, on the whole, stressed for far higher loads and more brutal treatment by an ignorant and heavy handed public than they will ever experience in a racing car. They have been subjected to an enormous amount of testing and development to guarantee their reliability, which explains the popularity amongst such manufacturers as Lotus and Cooper of wheel spindles and running gear off one of the smallest and cheapest production sedans in the World. Specially manufactured components are always a potential source of trouble. Not only is there the risk of failure of a totally untried design, but the difficulty of replacing these parts when they fail far from home can easily cost you the race that you could have won with a less esoteric design.

Now, to get down to a more particularized examination of the pros and cons of various design features, it has been my experience that most people who set out to build a special will have a particular engine in mind, around which they propose to build their car, and it is at this point that they make their first mistake. There are very few power units that are worth building a car around; no chassis, however brilliantly executed, is able to compensate for a serious lack of horsepower or reliability. Too often the engine itself is an "ifit". . . "if we do this and if we alter that the engine is sure to give unprecedented quantities of power with complete reliability", and so much time and



R-1 (left) and R-2 (right) both used Minor torsion bars. Wishbones are tubular copies of TD. R-2's steering is disconnected.

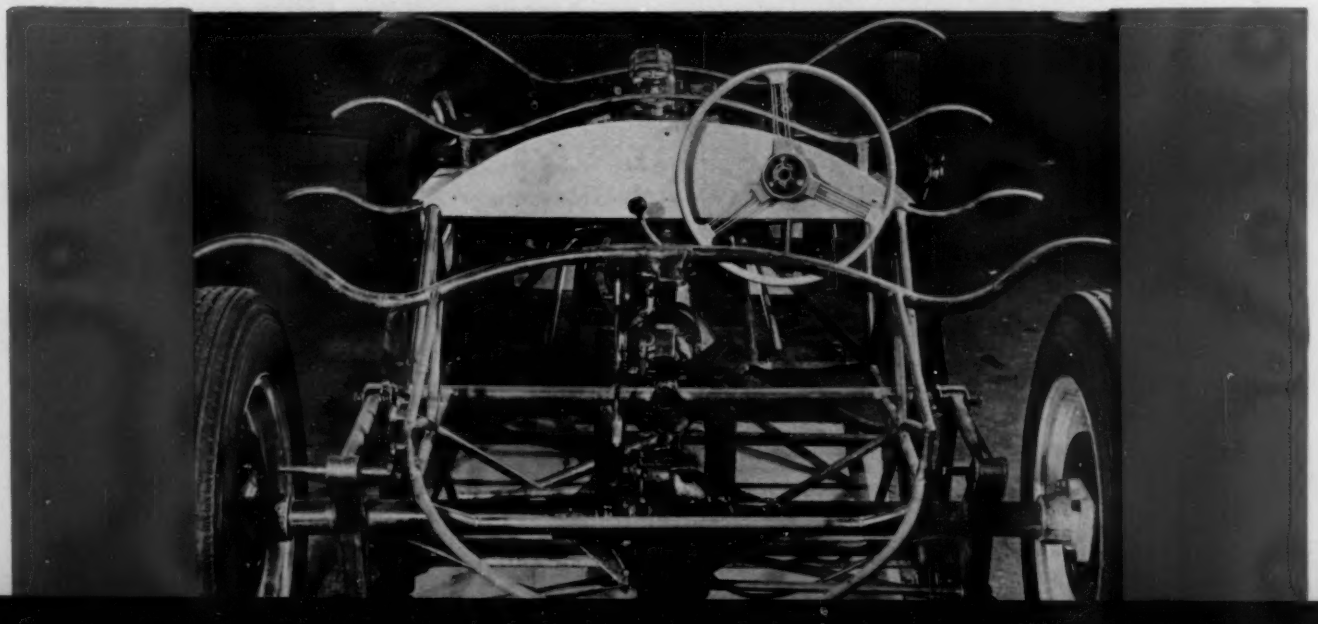
money is spent on trying to get power out of some cast iron clunk that there is none left to spend on the car. The only sound basis for your calculations is how much power you *know* the engine will give, and under what circumstances, without drastic, expensive and unpredictable modification.

What good power units are available? In the 750 cc class the field is fairly open. The miraculous little Crosley competes with the D B and the Renault, with the modified 750 cc version of the Fiat as a possible contender. First and foremost in the 1100 cc class is the Climax engine, nothing else approaching it in terms of power output per unit weight. Once you get amongst the 1500 cc cars nothing seems to run with the Porsche Spyder engine except the equally unobtainable 1500 cc Climax. In every class above that, Ferrari has achieved almost complete dominance, and not until you get into the really heavy metal do you find a domestic engine worthy of mention. I hasten to add that I have not overlooked the OSCA or Maserati power plants, but had discarded them both on the score of unreliability, whilst the engine with the greatest potential of them all is the little 1300 cc Alfa Romeo unit. I cannot think of why this engine has not yet formed the basis of a really fast 1500 cc car, unless possibly they are as unobtainable as the Porsche engine.

Having acquired an engine, a bottomless well of enthusiasm, and a little money (it won't be enough, it never is!), the next consideration is going to be the general layout of the body-cum-chassis. The type, style, material and proportions of the body will profoundly influence the type of chassis that is feasible, as will the design of the front and rear suspension and the type of final drive employed. I am assuming for the sake of discussion that we are considering a more or less conventional disposition of the major assemblies, with the engine at the front and the rear wheels driven. While there are undoubtedly points in favor of a rear engine location I believe that the average driver will be happier with the engine in front of him, and, generally speaking, the design problems are fewer. Perhaps it would be as well to examine the respective advantages of the three main types of chassis construction.

The chassis for the modern sports car should be designed to accomodate extremely supple suspension, with wheel movements in the order of four inches on both bump and rebound, for a total of eight inches overall, in line with current thinking. If the car is to handle well with so much wheel movement the suspension geometry must be extremely accurate, which requires as a basis an extremely rigid chassis, both as a beam and in torsion. Beam rigidity, the ability of the chassis to prevent itself from sagging in the middle, is easy to come by; torsional rigidity, the strength to resist "racking" when one wheel is under extreme load, is not at all easy to achieve with low weight. Probably the most efficient type of chassis frame that could be devised would be none at all, instead a body so designed that all the suspension, driving and braking loads were absorbed directly by the body skin without the aid of a separate chassis frame. If we consider the body as a large diameter tube, able to resist both twisting and bending loads, we can see that it is quite feasible to design a car in such a manner, especially if the car is a sedan or coupe. With our sports

Live rear axle is located by pairs of radius rods; lower right one is triangulated to give lateral location. *(Continued on page 46)*



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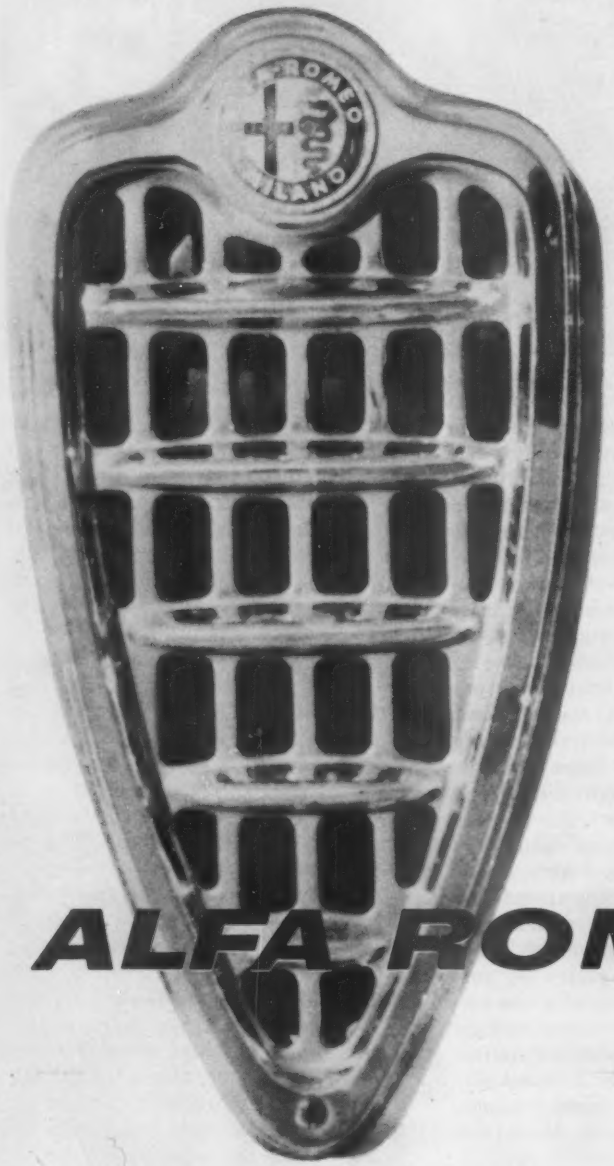


ALFA ROMEO 1300 TI

INTRODUCED at the Frankfurt Motor Show in 1957, the Alfa Romeo "TI" Berlina is a four-door 1300 Giulietta fitted with the 65 hp Sprint engine. With the introduction of the "Tourismo Internationale", Alfa has added a fast machine designed specifically for international touring car competitions in 1958.

Remember the last Mexican Road Race in 1955, when a team of the famous Alfa 1900 "TI" machines swept the board in their class as well as showing their heels to numerous higher powered cars in the mountains? Well, Alfa Romeo is at it again, going after the 1300 "family car" laurels with this souped-up, sawed-off little bomb that is a tremendous surprise from behind the wheel.

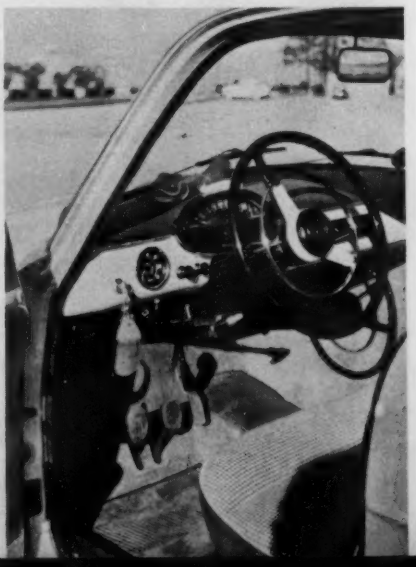
Mario Bernasconi, Alfa press relations chief, put a TI test car at our disposal for a week to do a tour of Italian factories. We picked it up at the Lugano (Switzerland) distributor, and with over 5000 miles already on the clock, it was obviously a well broken-in factory test car in an excellent state of tune.

The machine is basically a Giulietta from the ground up. Chassis, suspension and running gear are the same as the Sprint, except for the four-door sedan body welded to the platform frame. Distinguishing marks are hard to find. A plate on the dash says that it is a TI but there's nothing on the exterior. A half-pint' rev counter is set into the left side of the dash an easy glance away by the driver. The rest of the instruments are simple and well grouped, especially easy to read at night when illuminated. With the 100 mph speedo are fuel gauge, oil gauge, and a fuel warning light. In a separate cluster at the right are the oil and water temperature gauges. Toggle switches actuate wipers, heater blower and panel light while conventional pull controls operate choke and interior air distribution, which operated well in the cold Italian winter.

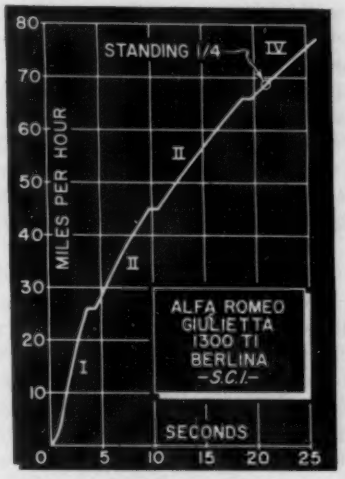
The most pleasant surprise was the discovery of a hand throttle just under the steering column. This proved to be a

Really barreling this family sedan into a turn on the Modena Autodromo, *the lock on the wheels indicates understeer. Increasing pressures in the tires improved handling.*

Although the TI uses the same chassis and running gear as the Sprint coupe and Spyder roadster, it is a very roomy 4-door sedan.



Plenty of room for passengers and their luggage. Trunk opens upwards, exposes Pirelli-fitted spare, tools and space.



big help when warming up the car after a freezing night. Instead of having to stay in the car and spend a minute playing footsie with the accelerator pedal, you could step up the idle and go back inside for a second cup of coffee. It seems to us that any sports-touring car should have a hand throttle, and Alfa is to be congratulated for providing this small but very convenient control. Turn indicators and a hand-operated dip switch complete the instrumentation.

Driving position was comfortable and pedal placement so ideal that it was almost a pleasure to heel and toe. Alfas are famous for this, even the pre-war machines had closely spaced pedals, but in those days the accelerator was between the clutch and brake. Thought had gone into seat design of the TI also, for there were slight naturally-fitting side braces in the seat squab offering a lot of lateral stability.

Physically, the TI lacks the beauty of line that the Sprint possesses: it has a stubby appearance that detracts from its Italian birthright. But like most Italian products, appearance does not necessarily indicate what is below the surface. The TI proved to be a lot of fun, from the spot behind the wheel.

It is surprising how much space Alfa has been able to provide inside their four-door Giulietta, for it is still a small car. It has the same wheelbase as the Sprint series, but there is ample room for four passengers and their luggage. The trunk is surprisingly large. Storage compartments inside the car are small: the glove compartment and the map pockets in the doors are too narrow to be of much use.

The hood latch was hard to find, but was finally located on the firewall directly over the pedals. An orthodox safety catch up front released the hood, revealing the compact 65 hp Sprint engine sitting well down in the engine room. There is easy access to plugs, oil dip stick and the like, but the battery is in the trunk away from engine heat. Instead of the single-throat Solex that comes on the conventional

(Continued on page 60)

ALFA ROMEO GIULIETTA 1300TI BERLINA

PERFORMANCE

TOP SPEED:

Two-way average	90 mph

ACCELERATION:

From zero to	Seconds
30 mph	5.4
40 mph	8.1
50 mph	12.4
60 mph	16.3
70 mph	21.7
Standing ¼ mile	21.1
Speed at end of quarter	69 mph

SPEED RANGES IN GEARS:

I	0-26 mph
II	6-45 mph
III	10-66 mph
IV	22-top

FUEL CONSUMPTION:

Hard driving	23 mpg
Average driving (under 60 mph)	27-28 mpg

BRAKING EFFICIENCY:

(10 successive emergency stops from 60 mph, just short of locking wheels)

Stop	Per cent
1	59
2	59
3	57
4	59
5	57
6	59
7	50
8	50 right rear locking
9	50 right rear locking
10	59

POWER UNIT:

Type	In line 4
Valve Arrangement	80° Dohc
Bore & Stroke	2.85 x 2.89 in (74 x 75 mm)
Stroke/Bore Ratio	1.01/1
Displacement	78.7 sq in (1290 cc)
Compression Ratio	8/1
Carburetion by	Solex 35 APAI-G
Max. Power	65 bhp @ 5500 rpm
Max. Torque	79.5 lb ft @ 3500 rpm
Idle Speed	1000 rpm

DRIVE TRAIN:

Transmission ratios	
I	3.31
II	1.96
III	1.35
IV	1.00
Final drive ratio (test car)	4.55
Other available final drive ratio	4.10
Axle torque taken by	radius arms and A bracket

CHASSIS:

Wheelbase	93.7 in
Front Tread	50.6 in
Rear Tread	50.0 in
Suspension, front	Coils and wishbones, anti roll bar
Suspension, rear	Coil springs, radius arms, A-bracket
Shock absorbers	Telescopic
Steering type	Worm and roller
Steering wheel turns L to L	3.5
Turning diameter	36 ft
Brake lining area	139.5 sq ins
Tire size	155 x 15 (equiv to 5.60 x 15)

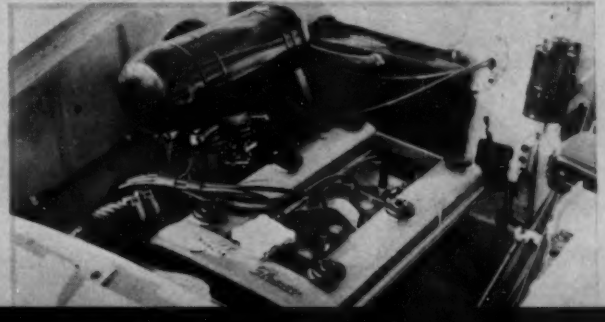
GENERAL:

Length	157 in
Width	61 in
Height	55 in
Weight, test car	2050 lbs
Weight distribution, F/R	49/51
Weight distribution, F/R, with driver	48/52
Fuel capacity	14 U. S. gallons

RATING FACTORS:

Bhp per cu in	0.83
Bhp per sq in piston area	2.41
Torque (lb-ft per cu in)	1.01
Pounds per bhp — test car	31.6
Piston speed @ 60 mph	1830 fpm
Piston speed @ max bhp	2640 fpm
Brake lining area per ton (test car)	136 sq in

TI engine is fitted with one double-choke downdraft Solex.



England's

by Dennis May

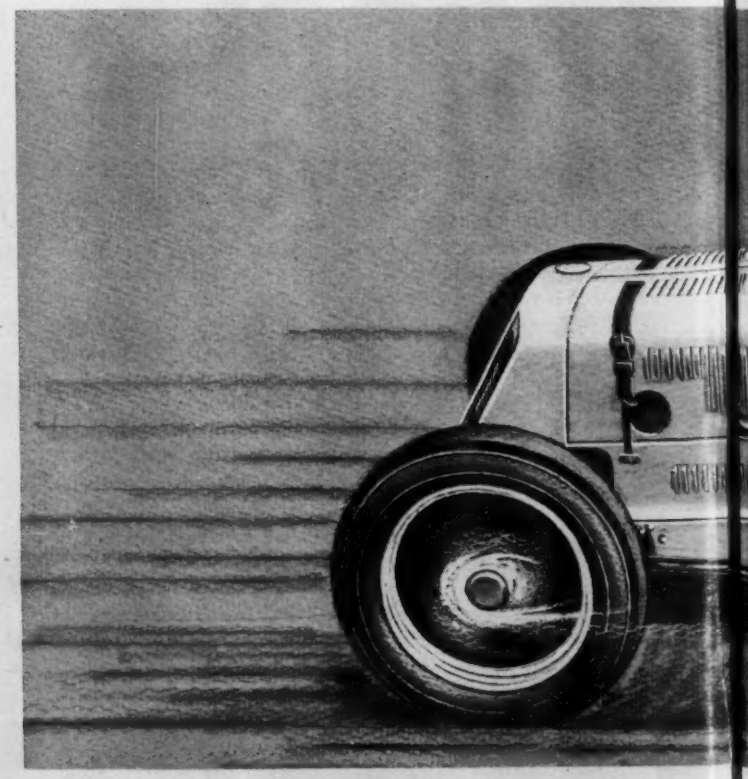
THE PENCHANT of British automotive commentators for sweet scented euphemism was put to a severe test by the publication, early in 1934, of the first photos and descriptions of the eagerly awaited E.R.A. racing car. Ransacking their vocabularies for civil ways of saying that the thing looked ten years out of date before it had even hit the starting grid, they made reassuring play with the fact that the design was just hopping with Well Tried Principles, passing thence to scholarly considerations of evolution *vs.* revolution. For their money, readers could infer, evolution was a many splendoured process.

In continental Europe, on the other hand, the debut of the gawky, gangling E.R.A. was greeted with more candour than kindness. Charles Faroux, the literary sage whose judgements had been law to two generations of French motorists, suggested that the initials could stand for English Racing Antiques. And an Italian contemporary reported a colony of dodos symbolically nesting at Bourne, the new make's birthplace.

As subsequent events were to show, the E.R.A.'s British apologists had been on firmer ground than they knew, while the heavy humorists in Paris and Milan never had any ground under their feet in the first place. Between 1934 and the 1939 shutdown, E.R.A.s were the dominant factor in European *voiturette* racing, winning a substantial majority of their encounters with the only continental marque – Maserati – that stayed in the running throughout this period. On the Avus circuit, Berlin, in 1937, a privately owned E.R.A. turned the fastest winning speed for any race

Fastest ERA of them all, excepting the jinxed E-type, was the R4D. Starting out as a B-type, it went through a series of modifications until the two liter engine developed 340 hp. Raymond Mays (above) severed with ERA; it became his car.

In 1939, the R4D was invincible in hill climbs, and at Brighton Speed Trials exceeded 160 mph in standing kilometer.



Racing Antiques

anywhere with a 1½ litre limit – 119.69 mph. At Dublin the same year a 2 litre E.R.A. averaged 102.9 miles per hour to win the annual Phoenix Park hundred miler – and that still stands as a record for road or airfield races in the British Isles, not excepting the British Grand Prix itself. Prior to the advent of Cooper in 1946, E.R.A. was decisively the most successful racing car ever produced in Britain; in fact, on a *pro rata* basis it is doubtful whether even Cooper has equalled the E.R.A. score to this day, for the total output of English Racing Automobiles was only sixteen cars, against around 700 Coopers.

To feel at home in an E.R.A., a man needed a head for heights. Overall stature of the car, not including the windshield, was forty-six inches. Distance from the road to the seat was twenty-one inches and the ground clearance gave points to a bath chair. Center of gravity came twenty inches above the countryside and the wheelbase was ninety-six inches. Treads, front and back, were 52½ and 48 inches respectively.

There were two reasons why the E.R.A. stuck up in the air such a long way. First, Reid Railton, who had been called in to design the chassis, made no secret of his belief that nature abhorred an ultra low center of gravity: breakaway on corners came later with such a layout, he admitted, but when it did come it happened with lethal speed. Second, as it hadn't occurred to English Racing Automobiles to put the engine at the back, or alternatively to spring the rear wheels independently, it naturally followed that clearance had to be allowed for the drive shaft to swipe up and down under the driver's seat. *Monoposto* form being the basis of E.R.A. architecture, it wouldn't have been easy to run the shaft alongside the driver.

Nature's abhorrences, as interpreted by Railton, also apparently included springs that sprang. Front and rear suspension both used flat springs of the type misleadingly called semielliptic; the front pair, outrigged from the chassis, being only 24 inches long and allowing a total deflection of less than an inch. Friction shocks were fitted fore and aft.

Pliant as a nautch dancer's torso, the original E.R.A. chassis was founded on two channel section side members, parallel and approximately horizontal ahead of the point where they curved up and over the back axle. At intervals, but not very close ones, lissom crossties were bridged in. In line with contemporary practice, it devolved on this chassis to perform high frequency contortions in response to the thumps and stresses transmitted to it through the practically inert suspension.

The E.R.A. engine being a variation on a theme conceived by Riley back in 1926, it could be argued either (a) that it was eight years out of date when it began its second lifespan, or (b) it had been eight years ahead of its time in '26. There was a choice of three displacements – 1098, 1488 and 1990 cc, all with six cylinders. Bore dimensions in the eleven-hundred and fifteen-hundred capacities were the same at 57½ millimeters, the corresponding strokes being 69.8 and 95.2 mm. The 2 litre type measured 62.7 by 107 mm.

Salient features of the engine design, all of them direct Riley legacies, were an iron crankcase and cylinder block

E.R.A. R4A by John Amendola

unit; a one piece forged crankshaft running in three bearings – plain at each end and roller type at the center; a detachable head with hemispherical combustion chambers and two valves per cylinder forming an angle of 90 degrees; dual camshafts set high up in the shoulders of the block and driven by gears from the nose of the crankshaft; and valve operation through short pushrods and overhead rockers. Cylinder head material was aluminum alloy, a departure from the Riley formula.

Onto this foundation E.R.A. doctored a vertical Roots type supercharger, mounted ahead of the front cylinder and inhaling from a single S.U. carburetor. Running at thrice engine speed, the blower gave a maximum boost of 16 psi and endowed the 1½ litre engine with an output of 160 bhp at 6500 rpm. Components such as pistons and con rods were entirely of E.R.A. design and had a beef factor appropriate to the assigned levels of rpm and combustion pressure. Contrary to Riley's recipe, engine lubrication was on the dry sump principle, with the oil contained in a tank under the driver's seat.

In just one department, the transmission, E.R.A. thinking ran off the rails of convention: in place of the crash type gearbox that was generally favored for racing at that date, they used a Wilson preselector box, operated by a short lever working in a quadrant close to the driver's right knee. The Wilson device, which had a vogue on one or two of the more expensive British passenger cars in the 'thirties, was chosen because it enabled the driver to play most of his

The "Well Tried Principles" upon which ERA's were built included a center of gravity twenty inches above the ground. Designer Reid Railton felt that an ultra low center produced a sudden breakaway, and a high CG was safer. Nonetheless, an occasional ERA driver got into trouble.

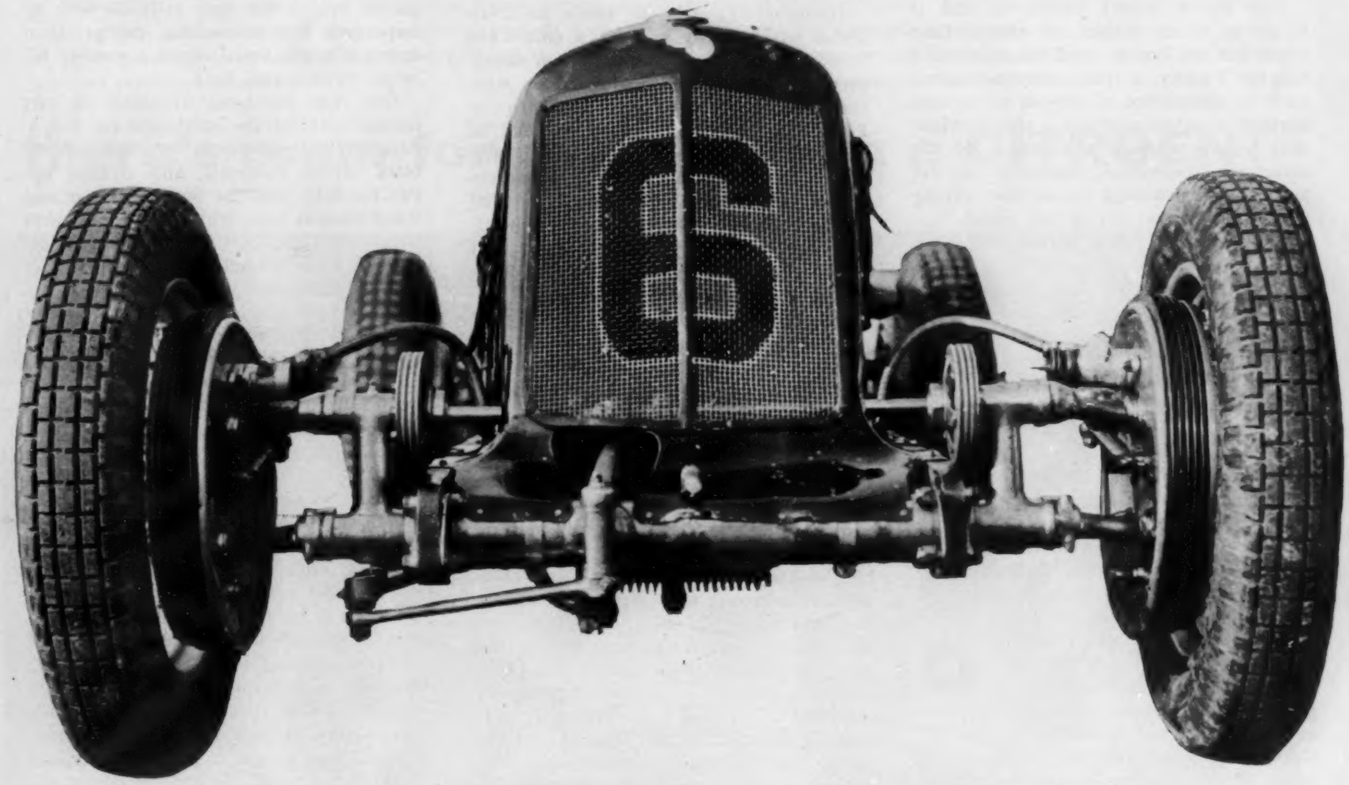
arpeggios in moments of relative leisure and mastery *between* corners. During cornering manoeuvers themselves, and on the immediate approaches to turns, it was considered prudent to have both hands on the wheel and keep them there. With the Wilson setup the preselected ratio was engaged by a jab on a pedal corresponding to the normal clutch pedal.

Yet even under two-fisted discipline at all critical points of the itinerary, the prototype E.R.A. showed such an itch for bloodshed that it had to be withdrawn after practicing for the first race it almost contested. This was the Mannin Beg of 1934, run over an imitation Monaco circuit at Douglas, Isle of Man. Part of the course traversed a wide but fairly bumpy road fringing Douglas Bay; and along this stretch, where assorted MGs, Rileys, Altas and Bugattis were merely chucking their drivers under the chin, the bolide from Bourne came close to chucking itself and occupant clear over the parapet and into the harbor. Raymond Mays, elected to the honor of sharing the car's first public appearance, well advisedly quit training and renounced his place in the lineup.

Public appearance number two, in the same year's British Empire Trophy at Brooklands, was slightly more auspicious, if only because it proved that the men behind the new marque didn't discourage easily. When the five-minute siren sounded for the field to assemble on the grid, the E.R.A. was pushed into position with a dead engine. Around it, under it, atop of it, mechanics swarmed and sweated and swore.

(Continued on page 44)

Zoller-blown ERA demonstrates scalding getaway, leaving assorted Maseratis and another ERA astern, at start of '37 Albi GP.



C-type with trailing arm front suspension. The overlapping parallel torsion bars gave different wheelbase measurements on opposite sides.

After ERA's were released for private sale, one of the privateers was "B.Bira", who beat the works cars more than they beat him

ERA

working like crazy to catch up on arrears of prepping. Zero hour came and they were still at it. The field departed—all except Raymond Mays and his little green tinderbox. Then, five minutes after the race had begun, a prayer and a shove brought the engine to life and Ray scrambled into the act. Sharing stints with Humphrey Cook, the man who had pledged a big slice of his personal fortune to put Britain on top in *voiturette* racing, Mays was still motoring spiritedly when Capt. George Eyston (MG) took the checkered flag 300 miles later, beating Whitney Straight (3 litre Maserati) to the trophy.

The E.R.A. wasn't placed, in fact it failed to finish within the official time limit; but the course used for that year's Empire Trophy, a track-*cum*-road layout with an abundance of slowish turns, had enabled it to demonstrate a characteristic that was to become a hallmark of the make: its acceleration, thanks to the flat power curve produced by the fast revving Roots blower, was out of this parish.

The genesis of E.R.A. is traceable to an earlier and more personal venture of Raymond Mays, who, in a racing career dating from the early 20s, had made a specialty of sprints and hillclimbs. For long associated with him in these activities was a former RAF pilot by name of Peter Berthon, who had a flair for making slow engines go fast and fast ones go faster. The fruits of this marriage of minds, with Mays doing the driving and Berthon taking care of development and tuning, were impressive, but the partnership had its frustrations too. Among these, in the period between 1930 and '32, was the inability to recapture for Britain the blue riband of British hillclimbing, viz., the course record at Shelsley Walsh, the tradition-loaded sprint mecca in Worcestershire. In the spring of '30, a continental star in the person of Hans Stuck, afterwards famous as an Auto Union team member in the Grands Prix, had won this prize for his native Austria, driving an Austro-Daimler.

Mays-Berthon cogitations finally led to the conclusion that, with appropriate support in cash and kind from the makers, the 1½ litre Riley could be devoloped and adapted into a hillclimber with what it would take to unstick Stuck's grip on the Shelsley record. When it came to scientific importunity, Mays' muzzle velocity was something to hear, and he quickly brought Victor Riley, head of the company bearing his name, around to his point of view. V. R. kicked in with a sizeable check, supplied a car as a basis to work on, and put valuable technical resources at the friend's disposal. The resulting machine, fitted with a Murray Jamieson supercharger of the pattern that was later to be featured on the earlier types of E.R.A., fulfilled all expectations and duly undercut Stuck's mark at Shelsley amid sounds of patriotic fervor. (For the record, though, it must be mentioned that the first to do so was an American on an Italian car—Whitney Straight with his 3 litre Maserati. But that's another story.)

The possibility of expanding their Riley project into something altogether more grandiose and far reaching did in fact occur to Mays and Berthon, but not with the slightest hope of the dream's practical realization. Where, for instance, would the money come from? . . .

This question, by some sort of telepathic miracle, took wing on a wavelength to which a certain Humphrey Cook was tuned in. Himself an oldtime race driver, Cook was probably the one man in all Britain who not only had the money but also a burning ambition to create and operate a stable of cars that would take the pants off the continentals in *voiturette* racing. He would really have preferred to go into business at full Grand Prix level, but was enough of a realist to see that English history only had room for one Francis Drake.

Humphrey Cook, a tall, beefy, patrician fellow with a fussy manner, a chivalrous heart and an attachment even on casual occasions, to starched white collars with the corners rounded off, as worn in Edwardian days, got onto the track of Mays and Berthon and laid his soul bare. All parties concerned being passionately of one mind, and Cook being reconciled to the principle that the financial headache was all his, a bond was cemented forthwith, and in due course formalized under the title of English Racing Automobiles Limited. Ray and Peter were made co-directors under Cook's chairmanship and the company made a home for itself in buildings erected at Cook's expense on a site adjoining Mays' home at Bourne, Lincolnshire. (Today, incidentally, the same buildings form part of the B.R.M. premises, Mays and Berthon being leading lights of this enterprise.)

Apart from the flexibility that was inherent in its channel section girders and lack of diagonal bracing, the E.R.A. chassis had less wrong with it than its Mannin Beg misdemeanors had suggested, and Reid Railton lost no time in getting the more vulnerable bugs out of it. These measures, mainly concerned with spring rates and suspension behaviour generally, paid off immediately, and during 1934 the initial batch of three cars scored a sensational run of success. Mays himself broke the world standing kilometer record with the 2 litre engine installed, took the s.s. kilometer and mile marks in international class F (1500 cc), beat Whitney Straight at Shelsley Walsh, clipped the 1500 c.c. record for the Brooklands Mountain circuit and won the Nuffield Trophy race at Donington Park. And Cook, although long past his prime as a driver, made pulp of three class G records—the international standing mile and kilometer and the Brooklands Mountain mark.

Although the company hadn't originally planned to build any cars for private owners, Humphrey Cook's ample wallet soon underwent such painful shrinkage that a change of policy became necessary. First independent purchaser was Pat Fairfield, the young South African who had learned his racecraft at the knee of the great Fred Dixon, and was afterwards killed at Le Mans; next came Dick Seaman, who was to win a place on the greatest Grand Prix team of all time—Mercedes-Benz—and crash fatally at Spa in 1939; third in the queue was Prince Chula of Siam, manager and sponsor to his cousin, Prince Birabongse (B. Bira for short), who caught on so fast that in the long run he beat the works cars and drivers more often than they beat him; then others followed . . . Arthur Dobson, Earl Howe, Peter Whitehead and smiling Johnny Wakefield, who lost his life flying with the Fleet Air Arm in World War II.

Cook's decision to hang out come-and-buy notices, largely dictated by the fact that the British race promoters of the '30s never paid a dime of starting money to native talent, however good, was to have historic repercussions on European 1500 cc racing. With as many as eight or ten E.R.A.s in simultaneous service—taking works and independent cars together—the effective range of operations was greatly widened. When, for instance, the parent *equipe* was busy at home with an important British meeting, the privateer strength might be deployed anywhere between Sweden and Italy.

Not that European frontiers by any means bounded the battlefield for E.R.A. Peter Whitehead took his well known black car to Australia, and cleaned up. Pat Fairfield won the South African and Rand Grands Prix, while in Cape Town's Grosvenor G.P., Earl Howe scored a victory off Piero Taruffi and Luigi Villoresi with the latest and hottest Maseratis. Too, E.R.A.s were easily the smallest displacement cars that contested the Vanderbilt Cup at Roosevelt Field, Long Island, in 1936, so it was certainly no disgrace for Pat Fairfield to place fifth there, behind the full-size G.P. cars of Nuvolari (Alfa), Wimille (Bugatti), Brivio and Sommer (Alfas).

Time did not stand still, of course, at H. W. Cook's knotfarm. The original design, known as Type A and already briefly outlined, underwent detail modifications in 1935 and emerged as Type B. Then, two years later, the Bourne alphabet progressed another letter to C, signifying a really substantial transformation in performance and raceworthiness. In Type C form the E.R.A. had the Maserati opposition skinned for power and speed, seldom losing a race to the Italians in 1937 and '38, except through mechanical failure.

That such failures weren't prohibitively frequent was something of a miracle, because the B-to-C change involved a 50 percent increase in power, gotten almost entirely by raising the supercharge boost to between 25 and 40 psi, depending on race duration. Maximum output from 1488 on became 240 bhp at 7500 rpm (a thousand up on the old turnover), representing a piston speed of 4700 fpm. Inside the engine itself, quite minor reinforcements were carried out and a plain center crankshaft bearing was substituted for the earlier roller pattern.

Source of the additional psi was a huge Zoller blower of eccentric vane type, fed by dual S.U.s and mounted at the extreme back of the engine, between the driver's knees. These Zollers, it must be admitted, were not paragons of reliability, sometimes disintegrating with costly results. Considering their proximity to a vulnerable part of the *pilote's* anatomy, it's a wonder a few E.R.A. veterans aren't going around talking falsetto.

(Continued on page 56)

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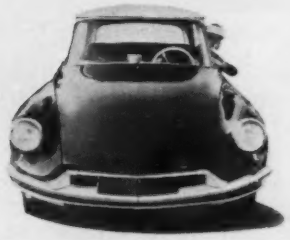

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BUILD IT RIGHT

(Continued from page 37)

car we have a rather different problem, since we are concentrating on keeping the size and weight as low as possible, since the cutout required for the cockpit and the engine represent such a large percentage of the total area of the tube. There is very little left to carry the load. The "D" type Jaguar is a perfect example of this type of chassis, and you will see from a study of this car that it was found necessary to provide a subframe to carry the suspension and engine loads. A further difficulty with this type of construction is that of avoiding local load concentrations around the suspension attachment points. I would feel safe in recommending this particular type of chassis only to those enthusiasts who work in the stress department of an aircraft factory.

Easiest of all to design, in that it is practically impossible to go far wrong, is the simple ladder-type frame, consisting of a couple of hefty tubular side members joined together with a small number of cross members of similar proportions. Not only is this type of structure inherently simple to lay out on the design table, but stress concentrations, due to the heavy wall thickness of the tube, are of little importance. It is easier for the home craftsman to construct, since he is dealing with a heavier gauge of metal that is easier for the amateur welder to work on and more adaptable to commercial arc welding.

By far the greatest majority of specials and of professionally-constructed racing cars of recent years, have been of this type construction. Even the latest products of Modena use basically simple ladder type frames stiffened up with a little elementary lattice work. What, then, are its disadvantages? Chief amongst them is such a frame is relatively heavy for a given torsional rigidity, but running a good second is the difficulty of fastening anything to a large diameter tube. All your suspension mounts, engine mounts, and body attachment points have to be bracketed off the main frame structure. The final chassis frame is far from the simple structure you originally envisaged, and far heavier.

The third type which is rapidly gaining favor, being used by such experts at the game as Mercedes Benz, Aston Martin, Porsche and Cooper, and represented in its highest and purest form by the Lotus is the "space frame", characteristically a frame made up of a multitude of small diameter thin-wall tubes either in tension or compression. The chief merit of such a structure is its light weight, the steel being used to its greatest advantage, but other points are the ease with which load concentrations can be spread over the entire frame structure and the ready availability of the frame structure for body mounting points. Indeed, given reasonable care in the design stage, internal body panels can be used as an integral part of the frame, thereby gaining some of the advantages of the stressed-skin type of construction.

The disadvantages of the "space frame" are not numerous but are formidable, namely the extreme care required at all stages of construction to ensure sound welds on the very thin wall tubing without distorting the whole structure, and the difficulty in achieving sufficient torsional rigidity through the cockpit area without extreme complication. A study of the Chevrolet S.S. Corvette will show you what I mean. On the whole, it would seem that the advantages lie with the "space frame", and I would certainly use this type of construction in any future car of my own.

So far we have discussed only the general aspects of the automobile, i.e., chassis form, basic frame, engine etc. From this point we can diverge in almost any direction in the matter of what we want to hang on this structure. Next month we will go further into these factors with suggestions as to specific items.

—Ken Miles

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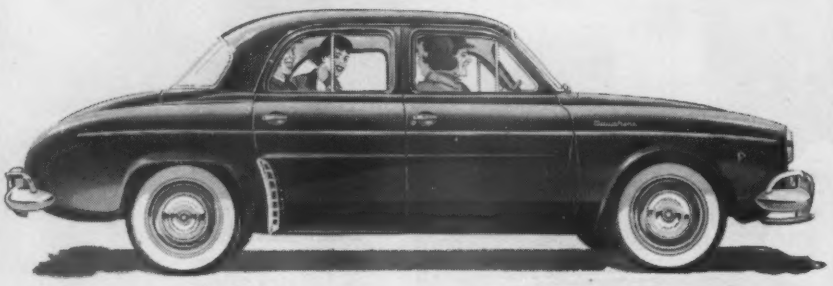

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SUPERSPORTS

(Continued from page 23)

Since the two coefficients are nearly the same, it is evident that the steel engine, with ⅓ the thickness, need have but ⅓ the temperature drop across the walls. Advantage may be taken of this from both ends; slightly lower wall temperatures will reduce lubrication problems while higher coolant temperatures (in a well-pressurized system) will permit vast weight saving in a smaller radiator. Even more important is the consistency of wall thickness, especially near the exhaust valves, avoiding undesirable hot-spots which can cause local material failures.

Because of the expense of making casting molds, fabricated steel gets the nod from a cost viewpoint, at least for limited production. (This is directly comparable to the use of fiberglas for auto bodies.) Freedom of design is a plus for this type of construction, but only when the problems of semi-mass production have been worked out, as they have in the SS two-liter. For instance, the ability to bond different types of steel together in a homogenous unit permits tool steel valve seats to become an integral part of the head, which is a still different alloy from the chrome-moly cylinders.

The combustion chamber of the SS owes no allegiance to the hemispherical shape pounced upon by Detroit some time back. There is a logical reason behind the discard of this shape. As compression ratio rises, the piston must be domed farther and farther into the hemisphere. When carried to its practical limits, we have the spectacle of one teacup inside another, resulting in a thin, curved combustion chamber of dubious efficiency. The SS head, which is bonded into the block, is a flattened saucer with three pipes protruding from its bottom, one each for plug and intake and exhaust ports. The actual shape of the chamber is the familiar "squish" type, strongly reminiscent of the Riley 4-port (for 4 cylinder Ford blocks), a popular racing conversion of the thirties. In the SS layout, the sparkplug is between the valves.

As a sohc engine, both the intake and the exhaust manifolds are on the right side of the block as viewed from the driver's seat, the ignition on the left. Intake port area is one-fifth of the bore area; exhaust ports are slightly smaller. At 6000 rpm, the 3.50 x 3.125 mill records a reasonable gas velocity of 250 ft per sec through the 1-9/16 inch intake port.

Many of the fine points in design of the SS are not apparent on surface examination, and it is necessary to get pretty far into the construction to appreciate them. For example: all external parts, including the cam housing, crankcase, shaft housings, water pump, oil pump, etc. are cast aluminum. The crankcase is a monocoque barrel, somewhat similar to the Offy but without side plates. It is cast in one piece and supports five huge bearing webs which

(Continued on page 64)

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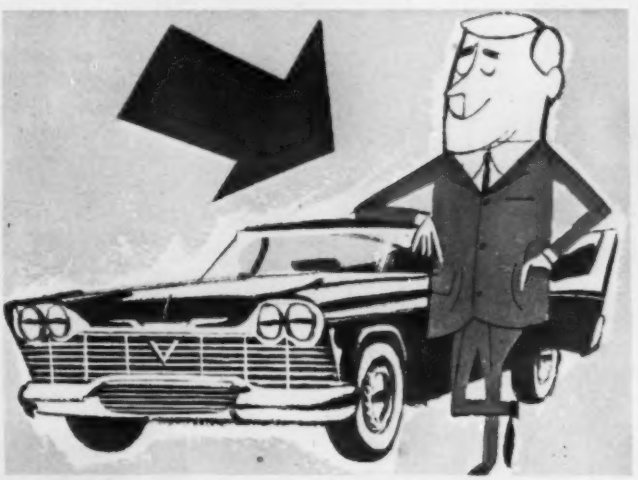
"Shotrod" Tinkerfinger wasn't in our minds either. "Shotrod" would be very unhappy if he ever got a mill tuned right and she *stayed* that way! (You don't nurse or pamper Plymouth's Golden Commando—you just *drive* it!)

And we ignored *Brother Bill Freebuck,* who *likes* to shell out dough. He thinks you have to go in hock for a $12,000 foreign job to get high performance. (Poor Bill, he's soon gonna learn "There's No Catching Plymouth" the hard way!)



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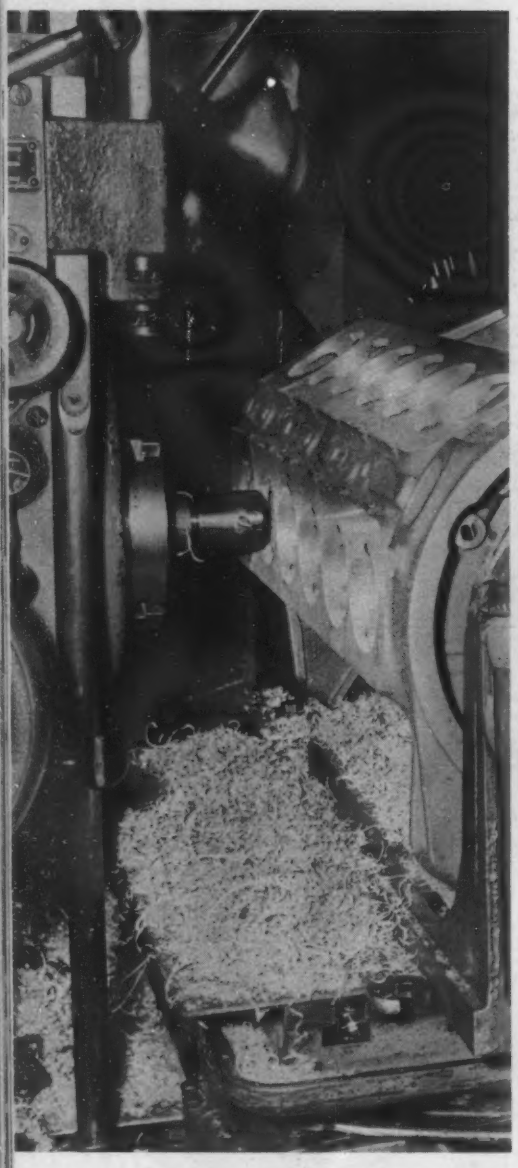
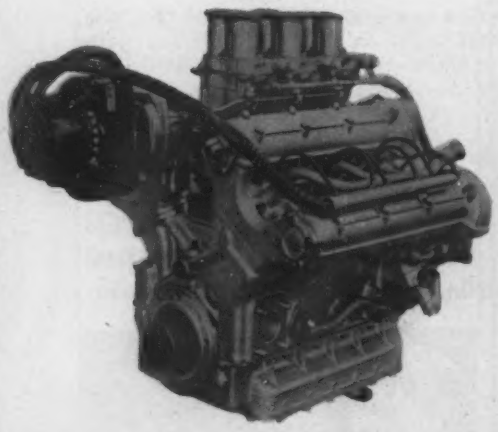


1

2

1 The famous Ferrari V-12 cylinder block is cast and completely machined within the Modena workshops. A horizontal borer prepares it for its wet cylinder sleeves. **2** and **3** Although the 250 GT we road-tested (SCI, Jan. '58) was the luxurious Boano-built coupe, the racing shield is normally carried by starker, lighter Scaglietti coupes. Three of these were caught by Jesse Alexander's watchful cameras at last year's 12 hour race at Reims. **4** Scaglietti's shop turns out not only a variety of these coupes but also the bodies for the racing cars (below) and the Scuderia's sports cars (see p. 15). **5** The 250 GT—the name *Europa* has been dropped—was displayed in chassis form at the Paris Auto Salon. Tube frame, coil and wishbone front, and a carefully located and light but live rear axle add up to superb road holding.

6



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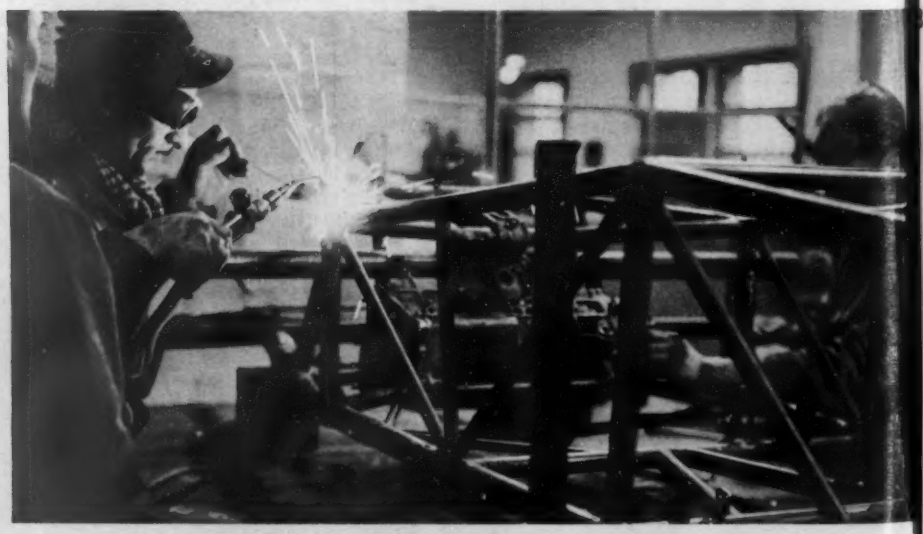

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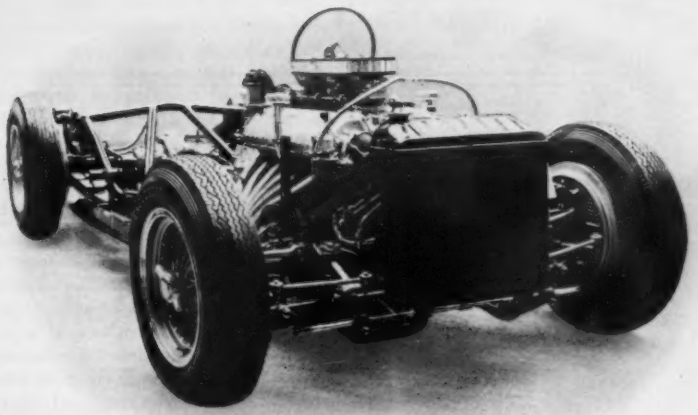
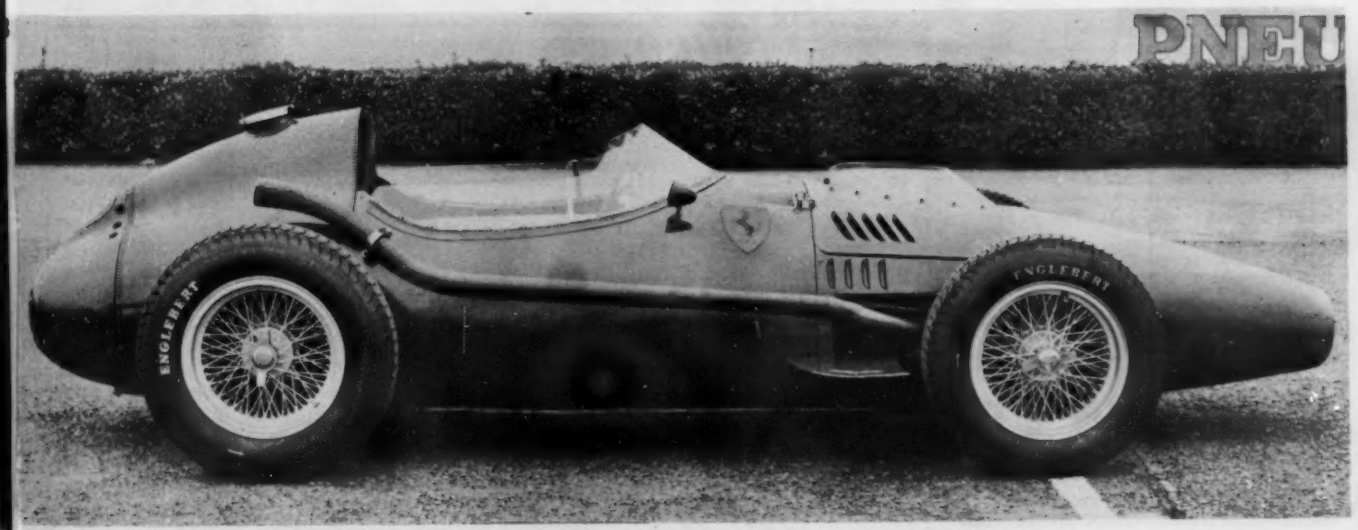


5

6 *Dino* 246, the 1958 F-1 engine, is an outgrowth of the F-2 *Dino* 156. Named in memory of Enzo's son, the V-6s inaugurate a new type-numbering system —engine displacement in tenths of liters followed by number of cylinders. 7 Gas welded frame carries the engine at an angle while the diff is offset to the left. 8 Small in size but big in potential!



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Jaguar

(Continued from page 29)

swinging the tail out as much as we dared on the narrow road, and we held with very little lean. Over the icy spots, the tail inching out, we were forced to back off, for with that little traction it's too easy to lean the tach needle on the peg. Once around the course and back to the starting line, inspection revealed that all four wire wheels were white with packed snow. We didn't clock our lap, but we know we didn't waste any time. Because of the snow and ice on the roads, top speed runs were impossible. We estimate 120 mph, but will postpone the actual runs until the ice clears.

One facet of the 3.4's behavior is worthy of comment. It's very much like skiing; the the faster you go, the easier it gets to maneuver. We were negotiating a lot of icy roads, the nasty kind that are dry for ten miles until you hit that big patch of ice and caked snow. At low speeds, on ice, we went through a motion we dubbed the "mambo"—a slight oscillation around the vertical axis of the car. We found that by going faster, say sixty, this condition disappeared, for the most part. When it did occur, it was very easy to control, and not at all dangerous. Incidentally, in fourth gear with the overdrive engaged, 2000 revs equals 60 mph! Care to try for the red line?

The ride is a remarkable combination of firmness and smoothness: comfort without wallowing. Small ripple bumps are absorbed; big ones are negotiated with a minimum of pitching or deviation. The size and action of the shock absorbers is perfectly balanced to the weight and suspension of the car. The smoothness of ride is counterpart to smoothness of detail.

Upon opening the wide doors, one is immediately impressed by the beautiful red leather that covers the foam-rubber padded seats. They're comfortable enough to sleep on, and the bucket-type front seats are designed with lateral support so that the driver can corner comfortably and safely. There is enough room to swing the arms around if desired and there is a maximum of visibility for a sedan. We drove the 3.4 hour after hour without stopping, and suffered no fatigue.

The edges of the windows and the dash panel—areas that in lesser cars are "decal" wood—are polished walnut. The Smith instruments are clustered in front of and immediately to the right of the driver, located in such a way that the tach sits right under his eyes. The speedometer and oil and water gauges sit slightly to the right and must be glanced at.

All small controls are push-button, except a two-speed wiper control that twists. Interior lights, instrument lights and heater-defroster blower are simple push-on push-off buttons. The temperature of the fresh air that enters the scoop and leaves the heater at feet level is controlled by a sliding handle. There are two storage compartments located to right and left of the panel; the former can be locked, while the latter is an open compartment for driving gloves and cigarettes. The handbrake is located on the left side of the driver's seat, and the overdrive switch (which works only in fourth gear) sits to the left and within finger-tip range of the wheel. In typical attention to niceties, the overdrive switch is made from a transparent material that illuminates when overdrive is engaged.

The engine compartment is filled by the engine, which is a bit of a tight fit at the fore end where the compartment narrows. You still have to remove the air filter to remove all the plugs, and the S.U.'s are not right where you can get at them; but accessibility is merely difficult, not impossible. It should not present any real problems, for *all* carburetor adjustments are now made from the top. Besides, the best place to take your Jaguar for service is back to Jaguar, who know how to get at things and what to do with the things they get at. One of the nicest touches, and symbolic of the thought and preparation that goes into the Jaguar you buy, is the arrangement of the road tools inside the trunk. These tools are located inside the recess of the spare wheel, covered, protected, and out of the way.

As you may have gathered, we like the 3.4 Jaguar sedan. The things we criticized are certainly of small importance; most fall under the realm of personal taste. In our opinion, the Jaguar 3.4 sedan that we tested is a magnificent automobile that no one in his right mind could seriously fault.

Len Griffing

T-BIRD

(Continued from page 19)

Bird these have been exploited only to a minor degree. The new Bird and the Lincoln are the firm's first unit construction cars and have been designed on the husky side. Time will indicate where metal can be removed without compromising the structure's strength and durability.

The new Bird we were able to drive was a production prototype powered by a 300 bhp, 352 cu in version of Ford's new engine with fully-machined wedge-shaped combustion chambers. The chamber is contained mostly within the cylinder, *á la* Mercedes-Benz, so that converting this engine to direct fuel injection should be extremely simple for the factory . . . when that time comes.

This is a very smooth, quiet V8 with hydraulic valve lifters and oversize crankshaft vibration damper. It mounts a single four-barrel carb and this combination will be the standard Thunderbird power package available for the high-priced six-passenger Fords. A dual four-throat manifold is not available but this lack will no doubt be exploited by speed equipment manufacturers. A point of interest to go-happy cats is the new Bird's extra-wide front track and spacious engine compartment. There is ample room there for the largest automobile engines being made in the world today and we'll no doubt be seeing privately-concocted '58 Birds hunkering down as the torque of 'way beyond 400 cubes hits the rear rubber. This will be the ultimate in lily-gilding, but the space is sufficient and therefore it will happen.

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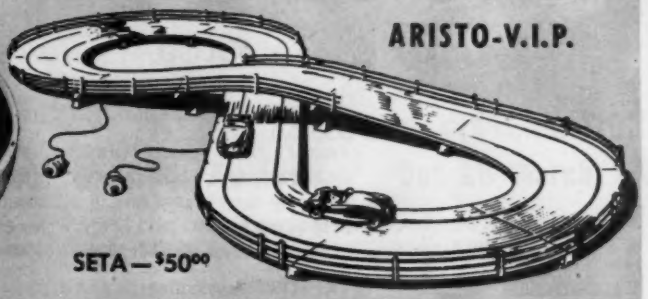

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T-Bird

(Continued from page 52)

The stop-spec Big Bird's performance is quite comparable with that of the '57 Bird, which certainly is calorific enough for the public by-ways. It can accelerate with just about any *gran turismo* machine in the world today; its sheer displacement insures this.

Thunderbird engineer Forrest Poling, author, and T-bird planning manager Tom Case survey huge engine room.

How does the new Bird handle? We talked with test drivers who had shaken the car down in Mexico, over the all-telling first leg of the old Mexican Road Race, the leg from Tuxtla Gutierrez to Oaxaca. They bubbled with enthusiasm. In their caravan they had taken a number of more or less competitive cars of other makes and they ran away from these easily in the mountains. "Best handling car we've ever driven," they said.

Although the just-quoted gents must have led sheltered lives it *is* a very nice-handling car. Without power steering and in spite of its ample weight it still responds sensitively to a light touch on the steering wheel. The recirculating-ball steering gear is quite free of friction and backlash, and can only be criticized for its slowness.

The prototype we drove did not have the flat-cornering character of the smaller Bird. The new stress on luxury has dictated softer springs and shocks and the reference line of broad, flat hood and front fenders accentuates a degree of body roll that otherwise still would be very noticeable. The car can be cornered at above-average speeds with a feeling of security, comfort and exhilaration, yet with very little tire squeal. Fore-aft weight distribution is almost precisely 50-50 with four aboard. But even with a light load in the very slightly nose-heavy car, steering characteristics are nearly neutral. During hard cornering the rear wheels do slide outward . . . but very gradually, very safely. It's a balanced-steering car with a trace of oversteer; it would take exceptional exuberance to get this car into trouble on a curve.

The new Bird's front suspension consists of unequal-length wishbones (termed SLA for "short-long arm") with coil springs, outboard-mounted shocks and a link-type stabilizer bar. These shocks are of the cutoff type in which piston travel is hydraulically locked before the end of the piston stroke is reached. This permits

elimination of the upper suspension rebound bumper, a secondary source of jolts that can be communicated to the car body, harshening the ride.

Rear suspension follows the newly current coil-spring and trailing arm practice so that the steel springs at all four wheels can be replaced readily with air suspension units. A Panhard rod or track bar is fitted at the rear to enhance lateral stability, and the trailing radius rods help to control axle windup under acceleration and braking. The potential rigidity of the layout is softened by the provision of rubber elements between axle and trailing arms.

Any car as fast as the Bird needs exceptionally good brakes and the car's engineers feel emphatically that they have come up with a major improvement. The brake drum size is no larger than it was on the '57 model, and effective friction area actually has been reduced slightly by the removal of a two inch section of lining from one shoe in each of the four brake assemblies. Centered in the resulting space and welded to the shoe is a slug of cerametalix friction material, ¾ x 2½ in at the front and ¾ x 2 in at the rear. Unfortunately, the prototype cars equipped with this combination of organic and inorganic linings were undergoing brake tests in the mountains of Pennsylvania and were not available for sampling.

We did, however, obtain access to engineering brake-test records and a set of these is reproduced in the data table. In FMC's fade tests decelerating force is held constant at 15 ft per sec.², or at approximately .5 g. The increase of pedal pressure from stop to stop is taken as one important index of fade. Ford also makes its constant-g fade stops from 90 mph, while SCI makes panic-fade stops from 60 mph and takes decelerating force in g's from stop to stop as a fade index. A direct conversion of pedal pressure to g's is inadvisable, but the official Ford figures are perfectly meaningful for our purposes. The leveling off of pedal pressure indicates a stable condition. Because the drums are very hot, they are dissipating a lot of heat, yet they are not too hot for the brake linings, especially the ceramic spots.

To summarize, the new Bird is both hot and roomy. It is a very good-handling car, though not as good as the shorter, lighter, smaller Bird. But it still is fun to drive, exciting to drive and highly distinctive. It is not a small car and its only claim to compactness rests upon its exceptionally low lines. It is luxurious and comfortable in every detail, was self-consciously designed as a prestige product, while the little Bird's high prestige quotient was bestowed on it spontaneously by the public.

Readers of SCI are likely to regard the relative bigness of the new Bird as a design blunder, but that is because we think in terms of getting out of a smaller car and into the big Bird. FMC, on the other hand, is thinking of the millions of average motorists who will get the same feeling from stepping out of a conventional sedan and into the new Bird, that we would get stepping from the new Bird into the two-seater. It is for that big, broad slice of the citizenry that the new Bird was created.

Griff Borgeson

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ERA

(Continued on page 44)

Cockpit of ERA, with the Zoller blower that whirred between driver's knees.

At a quick glance, and to an unpracticed eye, the difference between the C Type on the one hand the A and B lines on the other was not strikingly apparent. The general shape of all three cars was the same, the frontal area in each case running to the almost medieval figure of 13½ square feet. A closer look, however, revealed C features of real importance and value. The chassis, although unaltered in contour, was boxed instead of open channel. Front suspension was independent, using the system of transverse torsion bars and trailing arms designed by Dr. Ferdinand Porsche for the 750 kg Auto Unions. In the brake department, hydraulic Lockheeds replaced mechanically operated Girlings or a combination Girling-Lockheed tieup.

These advances, curiously enough, left the total burden where it was at around 1560 pounds unladen. Thus, power output per dry tone went up with the hitherto unknown figure of 330 bhp. Approximate maximum speeds for the A/B and C jobs were 125 and 140 mph respectively; and if this 15-per differential seems relatively small, it has to be remembered that nothing was done to improve the aerodynamic form or reduce the cross section of the C car. All alike in these respects, the A, B and C models were about as well streamlined as a Louis XIV commode.

The story of E.R.A. supremacy in European *voiturette* racing — the Formula 2 of its day — would fill fat volumes, and indeed has. At Peronne, Dieppe, Monte Carlo and Albi in France, Rommehed in Switzerland, Pescara and Turin in Italy, the Nurburgring and Avus circuits in Germany, Brno in Czechoslovakia . . . here and elsewhere across the face of the continent, Mr. Cook's English Racing Antiques gave all comers a hind view of their high, ungainly scuts. Time and again, the E.R.A. invaders filled the two top places, occasionally all three, chased gamely or lamely, as the case might be, by the Maserati competition. More rarely still,

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although with increasing frequency in '39, the Maseratis turned the tables, just as a reminder to Ye Olde Curiosity Shoppe to look to its technique.

It was on his famous black E.R.A., R.I.B., that Dick Seaman copped three straight victories during 1935, at Pescara, Berne and Brno; his speed for the Czech race, 81.40 mph, was less than a mile per hour down on Bernd Rosemeyer's winning figure on the big Auto Union in the same day's Masaryk Grand Prix over the same course. And when B. Bira, who held an English license and was therefore technically British in his racing capacity, copped the B.R.D.C.'s Gold Star aggregate award three years in a row—1936, '37 and '38—it was his assorted E.R.A.s that earned him most of his marks. (Incidentally, among the stratagems employed by Prince Chula, Bira's sponsor, was his practice of hanging out pit signals chalked in Siamese characters, known irreverently as Worms In Agony. Chula could speak and read English, and about five other languages besides, so other peoples' signals were no mystery to him.)

With the possible exception of the jinx-ridden E Type, of which only three examples were built and none was ever conclusively developed, the fastest E.R.A. of them all was the unique R.4.D. This car started life as a B Type and, after a series of mechanical reincarnations, became Raymond Mays' personal property when he severed his association with Cook in 1939. Rigged as a 2 litre, it was producing the prodigious output of 340 horsepower back in 1939 and became invincible in British hill-climbs and short distance circuit work. In the annual Brighton Speed Trials, approximate English counterpart to America's drag races, R.4.D.'s speed at the end of the standing kilometer was better than 160 mph. Considering that the same car, in identical shape apart from blower pressure, had also won several full distance road classics, including the Picardie Grand Prix, the International Trophy at Brooklands and the British Empire Trophy at Donington Park, this Brighton burst was a respectable performance. Old R.4.D. later joined the late Ken Wharton's stable, contributing about a half share to the wins that made him as nearly unbeatable in hillclimbs as Mays had been formerly.

In keeping with the old-world charm of the E.R.A. itself was the spirit of chivalry that dignified the racing relationship between the Bourne works *equipe* on the one hand and the E.R.A. independents on the other. This scrupulous ethical standard was well instanced by an incident during the International Trophy at Brooklands in 1936. In the heat and turmoil of a race-long battle between Mays, Bourne's official representative, and Bira, the latter's pit manager made a vital slip in his chart keeping. Under the mistaken impression that Bira was one lap up on Mays, Prince Chula signalled his cousin to take it easy. Cook, catching onto his rival's mistake, walked around to the Siamese pit and put Chula straight on the count. If he hadn't, Mays would have won. As it was Bira did — by one second in 262 miles.

Dennis May.

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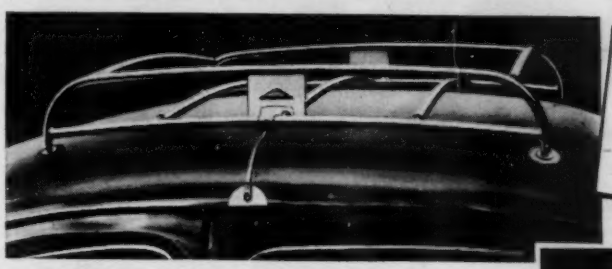

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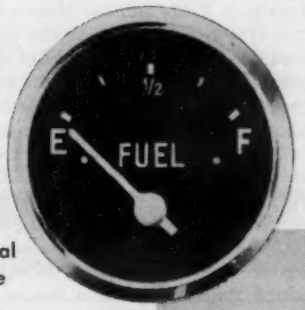

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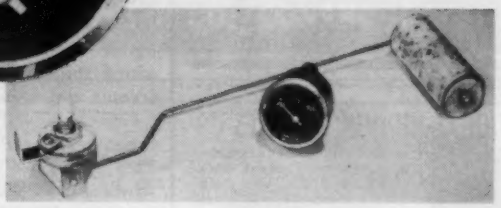

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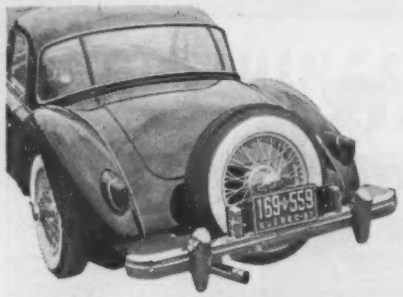

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SEBRING

(Continued from page 15)

Here's a bit of background on the race itself. Born on New Year's Eve in 1950, the Florida International Twelve-Hour Grand Prix of Endurance is now a healthy eight years old, and already Sebring's favorite son. (Don't go the wrong weekend or you'll think you've found a ghost town.) Put on the FIA's International Calendar in 1952, it changed its birthday to March and grew from six to twelve hours in length, and from a national SCCA event (a Crosley Hot-Shot had won) to become America's first road race to actually attract foreign entries since Roosevelt Raceway. In 1953 it became *the* American event which counted towards the Sports Car Manufacturer's Championship. Even so, "boys" were still allowed to compete against the men for several years more. Today it's strictly a man's race, and at that, the factory's men don't leave much room for the independent men.

As at Le Mans, the rules are a very important part of the race; they are the subject of much discussion, some of it heated, and inevitably, they seem to get changed a little each year. This year the changes are quite extensive. Eligibility is defined distinctly, which bears some going-into.

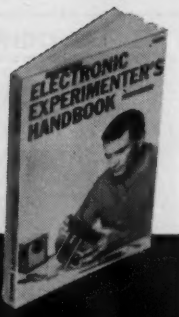
To fit in with the CSI's requirements for 1958 Championship races, sports cars at Sebring will be limited to three liters. Larger *sports cars* just may not run, not even "not-for-points." But for the first time there will be a separate, concurrent race for Grand Touring cars of *any* displacement over 500 cc.

This has given the quietus to much of the big machinery, just as it was intended to. We can write *finis* for Ferrari's over-four-liter V-12s and for Maserati's 4.5 V-8 which won with such ease last year. Jaguar needn't junk its D-types, but they have plenty of work cut out for themselves. For the Corvettes, there is an out; but more about this later.

Prize money is attractive without being shattering — except to the SCCA which requires that members donate their winnings to charity. For sports cars, the winner on overall distance will win not only the coveted Amoco Trophy, but also $3,000 which should pay for a few of his tires. Second and third get $1500 and $500 respectively as well as trophies. Trophies and the same amounts are awarded to the three best performers based on the Coefficient of Performance. In each class, the first three on distance also get trophies.

For G.T. cars things are slimmer, as there is but one money prize, $3,000 for first overall. As for sports cars, the first three in each class will receive trophies. With seven sports car classes (D through J) and nine G.T. classes eligible, there seem to be 48 class awards for the maximum of 65 entries. But pot-hunters will find that entries are none too easy to come by, as this is very much a race for the elite.

Your Coefficient of Performance is equal to the distance traveled in twelve hours (plus whatever time — up to ten minutes — it takes to finish the last lap) divided by your qualifying distance. Unchanged from



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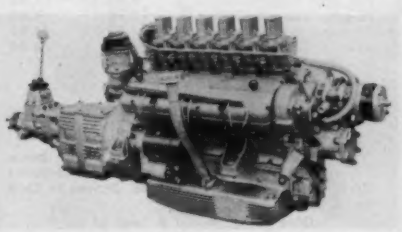
last year, the latter is determined from the formula:

$$\text{distance in miles} = \frac{825 \times \text{Displacement}}{\text{Displacement} + 250}$$

Engine displacement is measured in cubic centimeters. For both class and coefficient purposes, supercharging increases engine displacement by 40%.



Six-port heads and six twin-choke Webers, single ignition by two distributors, and this 73 x 58.8 mm V-12 pokes out 300 hp @ 7200 rpm. Four-speed Testa Rossa gearbox, all-synchro, transmits torque to live rear.

The 1958 race, to start at 10:00 AM, Saturday, March 22nd, is the second of eight events on this year's Championship List. The winning car's manufacturer will win eight points for his effort. Second through sixth get 6, 4, 3, 2, and one. These are awarded only to sports cars, not GT. Furthermore, a marque which places more than one car in the first six receives points only for the best placed one, though the trailing members of his team do keep others from earning the voided points. If a Maserati were to win, followed by five Ferraris in a row, Maserati would earn eight points and Ferrari but six. If just one of the Ferraris had beaten the Maser, then the scoring would be reversed. This keeps things more competitive, as a strong-but-slow team can no longer earn more points than the winner through sheer weight of numbers.

However, with a separate race being run for GT cars at the same time, it seems odd that a well-driven, say, Ferrari *Europa* which just conceivably could win the sports car race if . . . well, if, a lot of things . . . yet win no Championship points. The only out is for the GT entrant to renounce his GT status *before* the race and run as a sports car. This can get us involved in "What is a Grand Touring car?" or, "When is a GT car not a GT car?"

As a matter of fact, in our April, 1957 issue we published a very complete digest of both the FIA Appendices which are pertinent, C for sports cars, and J for Touring and Grand Touring. The latter has been slightly changed for 1958. The first change enables series production GT cars with factory-installed blowers to compete; as to be expected, they move up one class. Models which have been out of production for more than four years may no longer compete as Normal Series Production (i.e., "stock") Touring Cars. Factory-optional fuel tanks, radiators, and gear box and rear axle ratios are now considered stock, but in the case of the ratios, they must be available at no extra cost. Furthermore, for one recognized model, only two sets of gear box ratios (three, if one is an automatic) and only two sets of rear axle ratios may be listed on the "homologation" form. Special Touring Cars may now have

(Continued on page 62)

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ALFA

(Continued from page 39)

Giulietta Berlina, the TI version is fitted with a double-choke downdraft Solex 35 APAI-G with accelerator pump.

Once behind the wheel of the car and out on the open road, it's easy to feel at home. Our immediate reaction was that it would turn out to be a "fun car", and this proved to be true. The steering is light and quick: the gear lever, though situated on the column, is solid yet light, with the feel of the floor-mounted version found on the Sprint Veloce and Spyder. The engine is extremely responsive and the weight of the overall car has been kept down to a minimum. In traffic, one is laps ahead of the rest of the pack by merely using engine revs and the gear box as they ask to be used. Shifts can be rushed without gronching noises jumping out from under the floor boards.

On the *autostrada* we checked the speedo and found it to be hopelessly fast, but a maximum in third gear proved to be an honest 65 mph. As for top speed, we were able to clock only a 90 miles per hour two-way average, but with a bit of attention to the carburetor, the TI should reach its advertised 95 with ease.

At high revs engine noise was loud, but the wind noise was less than that of the Sprint Veloce. At high revs in high gear, there is the same feeling of extreme confidence that the Veloce inspires.

Brakes are taken directly from the Sprint, and no criticism is needed. Giulietta drivers know that their best weapon is their anchors, and this little four-door bomb is no exception. We had fade in our test, but recovery was almost immediate. Brake potency is amazing, even though the system is not servo-assisted.

Cruising speed of the TI is anything up to 90 mph. Stability is good at high speeds and fast cornering showed the car to have excellent road holding qualities on either Pirelli "Cinturato" or Michelin.

To determine the car's mannerisms on the track, we took our TI to the Modena *"autodromo"*. This is not an earthshaking circuit, but still it offered opportunity to discover how the car behaved when really trying. Fast corners offered no problems; but on slow to medium fast (such as the "S" corner at Modena) we found too much understeer for complete happiness. Adjusting tire pressures, both front and rear, altered the slip angles of the tires, putting the car in a better frame of mind to turn, and us just in a better frame of mind. Rear end breakaway could be provoked, but as the British say, in "an untidy manner". The high rev limit gives the car considerable flexibility.

Complaints center around the poor-quality and small dash and window controls, and the trunk latch is stiff and difficult to actuate without undue force. But aside from this, the TI is a first class sports-touring type car with near perfect brakes, and a lively, well-proven 4 cylinder dohc engine. For the frustrated family man who wants to put some fun in his motoring—real Italian style fun that is—don't walk, but run to your nearest Alfa dealer.

Jesse L. Alexander

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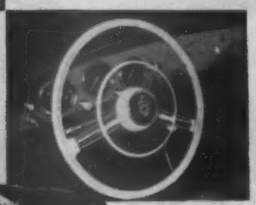

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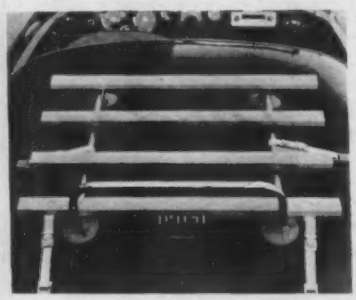

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SEBRING

(Continued from page 59)

minor mods made to the casings of the gear box or rear axle, either for mounting an overdrive, or for changing ratios.

Now on Grand Touring cars, the minimum quantity manufactured in twelve months is to be 100, identical with respect to "mechanism and coachwork." Some key phrases:

"GT series production cars must be equipped with . . . coachwork enabling a normal touring use, particularly as far as comfort, accommodation, and protection against bad weather are concerned."

". . . the top must have the nature of definite equipment . . . liable of being used part of the time or permanently during the event . . . may be replaced by a detachable hard top."

Dimensions are as for sports cars in Appendix C, except that internal width of the cockpit need be but 43.4 instead of 47.3 inches! Vertical height of the windshield must be 7.9 rather than 5.9 inches. Luggage space is required, 5¼ cubic feet for one liter cars and a minimum of 3.6 for smaller ones.

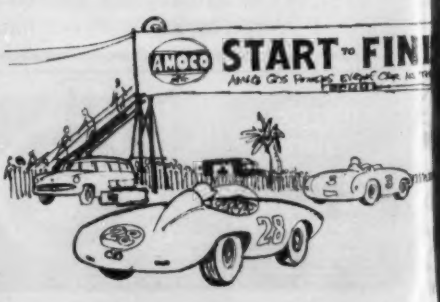
In case you're confused, a rough simplification is that if the SCCA call it a stock sports car, then the FIA has homologated it as a GT car.

At first glance, the unchanged paragraph on Special Grand Touring Cars sounds like an opening for the Corvette SS, but alas, it isn't. Again, to quote:

"Special Grand Touring cars are vehicles derived directly . . . from . . . Grand Touring series production cars . . ." The key word is "directly." Ah, well.

Still, an XK150 with a D-type engine is certainly eligible, so is a Corvette complete with an awful-awful power house, or other all-out souped-up, gutted versions of any stock GT cars. But it must be a *Grand* Touring car, because this year's regs specifically bar Touring cars. (Over 1000 cc, the difference is that Touring cars must have four full-size seats, GT but two.)

This year's Sebring regulations, which supplement the FIA's Code Sportif and its appendices, make several departures from past practice. The most drastic change is permission to keep spares in the pits instead of on board. The former rule always meant a compromise between weight and performance on one hand, and safety-in-numbers on the other. No longer must an entrant who has traveled thousands of miles be forced out through the failure of a minor part. The paying public can hardly be enthused, either, when a top notch entry is forced out with an ordi



narily-repairable failure. Neither can the manufacturer. The liberalization is more than generous. Paragraph 6 (a) states:

"Competitors may have at their disposal either on board the car, or in their pit, every spare part or tool that they may require. However, such spares whether carried on board or stored in the pit must be component parts. Complete engine, gear box, or rear axle assemblies may not be used."

This is a vast change from previous years and will stir up a hornet's nest of discussion and dispute. Not the least of it will center around the question of when does a component part become a complete assembly? Talking with energetic Alex Ulmann, we got this example: generators, starters, and complete cylinder heads may be swapped, but complete cylinder blocks (short blocks?) may not. Perhaps further supplementary regs will clarify this a bit more. For instance, may the fairly-quick-change BMC ring and pinion sets be replaced *in toto* or are they considered rear axle assemblies? Time and a few arguments will probably straighten this out — before the race, we trust.

The picture on driver changes is best given by quoting again from the regs;

"(7) Drivers and Crews:

(a) One driver may drive for the full 12 hours. He may, however, have 1 or 2 relief drivers, i.e., total drivers per car may be 3. Drivers on teams may be switched from one car to another within the team, even though they have driven another car in the team. (See below).

(b) .....

(c) If a team car is scratched and is withdrawn from the competition, the team manager may elect to appoint the entire crew of the scratched car to another team car. The displaced crew may not drive for the rest of the competition, and this privilege, which applies only to cars of the same make entered as a team, can be exercised only once by each team."

Last year, once a driver had driven a car in the race, he was "frozen" to that car. Other minor changes relating to the crews permit them to give signals from the edge of the course in front of the pits, rather than from the pit apron only. The drivers, often rather particular about their helmets, need not mark them with colored Scotchlike bands as required last year. In deference to European tastes is the elimination of this one: "The driver must *use*

(Continued on page 66)

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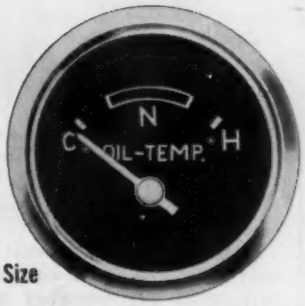

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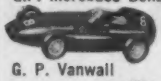
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SUPERSPORTS

(Continued from page 48)

are turned to zero clearance for mating with the line-bored inner supports. The case is split longitudinally at the three center webs, and bolts are threaded in horizontally to spread the gap. The concentric bearing webs (cast in two pieces and machined together) are then assembled around the crankshaft and the entire unit is pushed in from the front. Once in place, the spreader bolts are removed and a cap screw at each main is cinched down.

The crankshaft is unusual, too. Cast of ductile iron, it has a continuous hollow core, much like the Ford *Taunus* 1500. Abrupt changes of thickness where the journals join the webs in solid cranks cause internal stresses as the metal solidifies. In the two-liter's hollow crank, the changes in thickness are much less abrupt. A further benefit is the weight reduction for given size journals. Oil is pressured through the shaft in the conventional manner, but each hollow acts as a small reservoir, giving an extra margin of safety in case of a sudden dumping of lubricant. A standpipe arrangement has been included to trap small particles which might get into the oil stream, centrifugal force keeping them at the bottom of the cavity while oil flows up the small tube to the bearings.

Power can be taken from the SS at either end. This makes it a natural for marine applications as well as automotive, and the first non-dyno installation was actually made in a hydroplane.

Further twiddling with carburetion and cams on the dyno will be productive in establishing the right combinations for marine, sports car and other possible applications. Accessibility of the overhead cam makes this sort of experimenting easy and rewarding. The cam is driven from the crank through bevel gears and a tower shaft which is splined on one end and tapered on the other. To change valve timing in relationship to the crank, all that is necessary is to loosen a bolt threaded into the shaft through the top bevel gear, tap the shaft lightly, twist the cam to the desired position, reseat the gear on the taper and snug up the bolt. Any Crosley inconveniences have been well solved. Eight cap screws secure the cam cover and ten bolts hold down the cam bearing halves, so changing cams is a snap. Broad cam cups cover dual Chevvy springs which return the valves (likewise Chevvy) at about 180 lbs. pressure. The valves seem long to those who are accustomed to working with small imported iron, but they have withstood the high rpm that hot-rodders use with the Chev V8s and there's no reason to expect any less here.

The lower portion of the front case is occupied by bevel gears driving the vertical shaft, oil pump and the distributor. As a possible replacement for BMC and other import engines in more or less short-block form, it was thought well to use as many existing accessories as practical . . . hence the Lucas distributor, starter and generator. The mounting pads are arranged for MG and Healey installation and the bell

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housing accepts the gear boxes of these cars directly, taking others through adapter rings. The side-draft SU jugs, common to this strain, are also suited to the SS and dropping a two-liter into most of the small sports cars or sedans should pose only minor problems. The lightened weight of the front end may cause some suspension problems, but Lloyd avers that his TD 96 was a handling marvel and had less tendency to push the front end out in the corners than a stocker. As more conversions are made these values will become apparent.

The first SS was set up with Solex 40 PII carburetors bearing 29mm venturis. These were deemed adequate for preliminary tests, but larger ones are necessary before high speed potential can be explored. An all-out version will probably call for a different spark distribution set up as well. But, even without fancy extras, the SS compares extremely well with existing two-liter jobs . . . most of which are hardly available as a package and some of which are stratospheric in cost.

Best known of the Class E performers is probably the Triumph, a sturdy sort which hasn't gotten around to subscribing to the over-square theory. This 1991 cc pushrod four has an 8.5/1 compression ratio, and develops 100 bhp @ 5000 rpm and 118 lb-ft of torque @ 3000 rpm.

Pertinent details of other 2 liter power plants are shown in tabular form. Accurate weight estimates are not at hand for most of these specimens but the TR is known to tip the beam at about 350 lbs. The Bristol would probably be a bit heavier, the Maser might be a trifle lighter with its extensive use of aluminum. None, of course, can approach the SS' 180 pounds, nor do any of the group boast its 12/1 compression ratio. Horsepower ratings and torque comparisons show the SS in great shape, too, exceeded only by the Maser 'all-undone' model, and when the final returns are in, that figure may well be equalled or surpassed. Priced at $800 (give or take a few bucks) the SS is a champ.

Coincident with the favorable economic picture is the availability of spares. In addition to the previously noted Chevvy items, Ford Six rods and '54 Ford V8 pistons can be used. All bearings, (main, crank and cam) are standard sizes to be found at any parts supply house. Taylor's plans to keep a good supply of alternate cams and other vitals warehoused at all times. Production is being set up to handle a limited number of engines, but it is expected that they will be available in good quantity within the next six months. All tooling necessary to manufacture the various parts is ready to build the first five engines, so that the only lag between prototype and production will be testing time — in car, boat and on the dyno.

One SS is being put into a Devin-TR for street use and another will be installed in a hydroplane, but the most exciting possibility is that one two-liter will go into a featherweight Devin tube-frame chassis. Suitable housed in the fiberglas body, it will be entered in as many races as possible.

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Sports Cars Illustrated
April, 1958

SEBRING

(Continued from page 63)

the safety belt at all times when the car is on the circuit during practice and the race." As many organizers have discovered, there is no point in rules that can't be enforced.

An unchanged reg permits only the driver to work on the car away from the pits. As a second thought on driver changes, with as many as three allowed to a car, there is nothing to prevent an astute team manager from nominating his chief mechanic as driver (if he can get him an FIA driver's license, that is). Because, if the car breaks down out on the circuit, the rules permit the current driver to hot-foot it to the pits (no Vespas or Lambrettas), report the sad details to his mechanical type co-driver who can then and there effect a driver change with him and, fresh as a daisy, run-not-walk to the disabled car with the necessary parts and tools, make the repairs and drive — ahh, that bucket makes a comfortable seat — back to the pits.

With a Le Mans start, there is no starting line as such. At Sebring, the timers' and scorers' stand is located, for their convenience, part way around the slow 90° turn before the pits. And from the timers' point of view, the finish line is quite naturally directly in front of them, *in* the corner. For safety's sake, the checkered flag is displayed a hundred yards away in front of the pit area. The first time past the timers' stand, the cars are considered to have finished a standing lap, even though it is a bit short of the full 5.2 miles. The winner of the race will be the first car with the most laps across the *real* finish line after 10:00 PM. Now, it's most unlikely that the finish should be neck and neck after twelve hours of Sebring's blistering pace, but if it is, we might be treated to a repetition of that fabulous spectacle at the 1950 Grand Prix at Albi — the finish line there is on a corner, too — when Raymond Sommer just nosed out Fangio for first place honors by going into the corner hopelessly fast and sliding madly out of control across the finish line — *backwards*. Well, you never can tell.

Stephen F. Wilder

Classified

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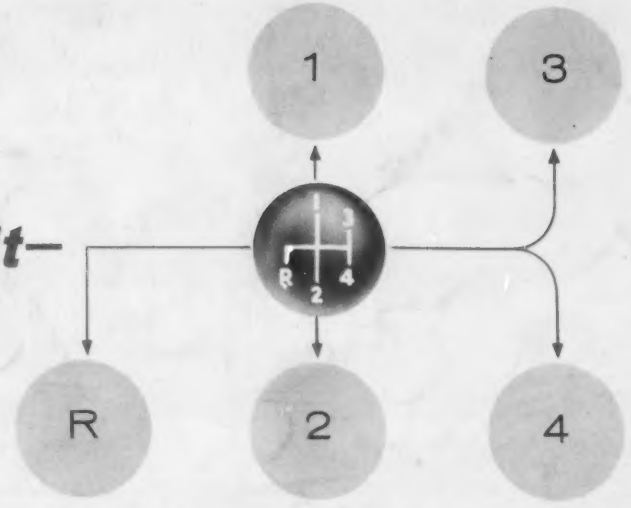

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